PHILIPS 32PW8719

MODEL

SERVICE MANUAL

Colour television

Chassis

A02E

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Service
Service
Service

Service Manual

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PHILIPS

1. Technical Specifications, Connections, and Chassis Overview

Index of this chapter:
1. Technical Specifications
2. Connections
3. Chassis Overview

Note: Figures below can deviate slightly from the actual situation, due to the different set executions.

1.1 Technical Specifications

1.1.1 Vision

Display type	: CRT, Real Flat
Screen size(s)	: 28 inch - 16:9
	: 29 inch - 4:3
	: 32 inch - 16:9
Tuning system	: PLL
IF frequency	: 38.9 MHz
Colour systems	: PAL: B/G,D/K,I
	: SECAM: B/G,D/K,L/L'
	: NTSC-playback
Channel selections	: 100 presets
	: UVSH
Aerial input	: 75 ohm, IEC-type

1.1.2 Sound

Sound systems	: FM-mono, AM-mono
	: FM-stereo: B/G
	: NICAM: B/G,D/K,I,L
Maximum power	: 4 x 10 W_rms (int.)

1.1.3 Miscellaneous

Mains voltage	: 220 - 240 Vac
Mains frequency	: 50 / 60 Hz
Ambient temperature	: +5 to +45 deg. C
Maximum humidity	: 90 % R.H.
Power consumption	:
- Normal operation	: ≈ 115 W
- Standby	: < 1 W

1.2 Connections

1.2.1 Front and Top Control, Side I/O Connections

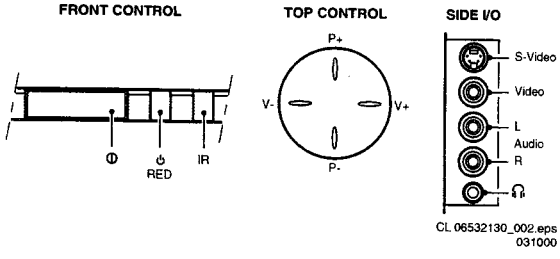


Figure 1-1 Front and Top Control, Side I/O connections

Hosiden: SVHS - In

1 - Y	Ground	⏚
2 - C	Ground	⏚
3 - Y	1 Vpp / 75 ohm	⊖
4 - C	0.3 Vpp / 75 ohm	⊖

Cinch: In

- CVBS	1 Vpp / 75 ohm	⊖◎
- Audio - L	0.5 Vrms / 10 kohm	⊖◎
- Audio - R	0.5 Vrms / 10 kohm	⊖◎

Mini Jack: Headphone - Out

- Headphone	32 - 600 ohm / 10 mW	◎

1.2.2 Rear Connections

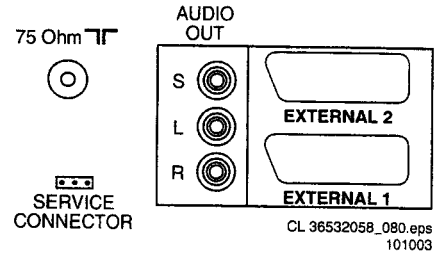


Figure 1-2 Rear connections

Aerial - In

- IEC-type	Coax, 75 ohm	⊓

Service connector

1 - SDA-S	I2C data (5 V)	⊖⊖
2 - SCL-S	I2C clock (5 V)	⊖
3 - GND	Ground	⏚

Audio - Out (Cinch)

S - Surround	0.5 Vrms / 1 kohm (optional)	⊖◎
L - Audio - L	0.5 Vrms / 1 kohm	⊖◎
R - Audio - R	0.5 Vrms / 1 kohm	⊖◎

External 1: RGB/YUV and CVBS - In/Out

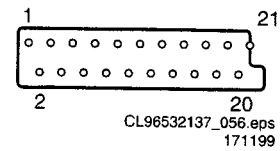


Figure 1-3 SCART connector

1 - Audio - R	0.5 Vrms / 1 kohm	⊖
2 - Audio - R	0.5 Vrms / 10 kohm	⊖
3 - Audio - L	0.5 Vrms / 1 kohm	⊖
4 - Audio	Ground	⏚
5 - Audio	Ground	⏚
6 - Audio - L	0.5 Vrms / 10 kohm	⊖
7 - Blue / U	0.7 Vpp / 75 ohm	⊖
8 - CVBS-status	0 - 1.3 V: INT	
	4.5 - 7 V: EXT 16:9	
	9.5 - 12 V: EXT 4:3	⊖
9 - Video	Ground	⏚
10 - N.C.		
11 - Green / Y	0.7 Vpp / 75 ohm	⊖
12 - N.C.		
13 - Video	Ground	⏚
14 - Video	Ground	⏚
15 - Red / V	0.7 Vpp / 75 ohm	⊖
16 - Status / FBL	0 - 0.4 V: INT	
	1 - 3 V: EXT / 75 ohm	⊖
17 - Video	Ground	⏚
18 - Video	Ground	⏚
19 - CVBS	1 Vpp / 75 ohm	⊖
20 - CVBS	1 Vpp / 75 ohm	⊖
21 - Shielding	Ground	⏚

External 2: CVBS and Y/C - In/Out (for recorder)

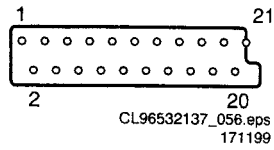


Figure 1-4 SCART connector

1 - Audio - R	0.5 Vrms / 1 kohm	⊖→
2 - Audio - R	0.5 Vrms / 10 kohm	⊖←
3 - Audio - L	0.5 Vrms / 1 kohm	⊖→
4 - Audio	Ground	⏚
5 - Audio	Ground	⏚
6 - Audio - L	0.5 Vrms / 10 kohm	⊖←
7 - C-in	0.7 Vpp / 75 ohm	⊖→
8 - CVBS-status	0 - 1.3 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	⊖←
9 - Video	Ground	⏚
10 - Easylink	(P50)	⊖←
11 - N.C.		
12 - N.C.		
13 - Video	Ground	⏚
14 - Video	Ground	⏚
15 - C	0.7 Vpp / 75 ohm	⊖←
16 - N.C.		
17 - Video	Ground	⏚
18 - Video	Ground	⏚
19 - CVBS-out	1 Vpp / 75 ohm	⊖→
20 - YCVBS-in	1 Vpp / 75 ohm	⊖←
21 - Shielding	Ground	⏚

1.3 Chassis Overview

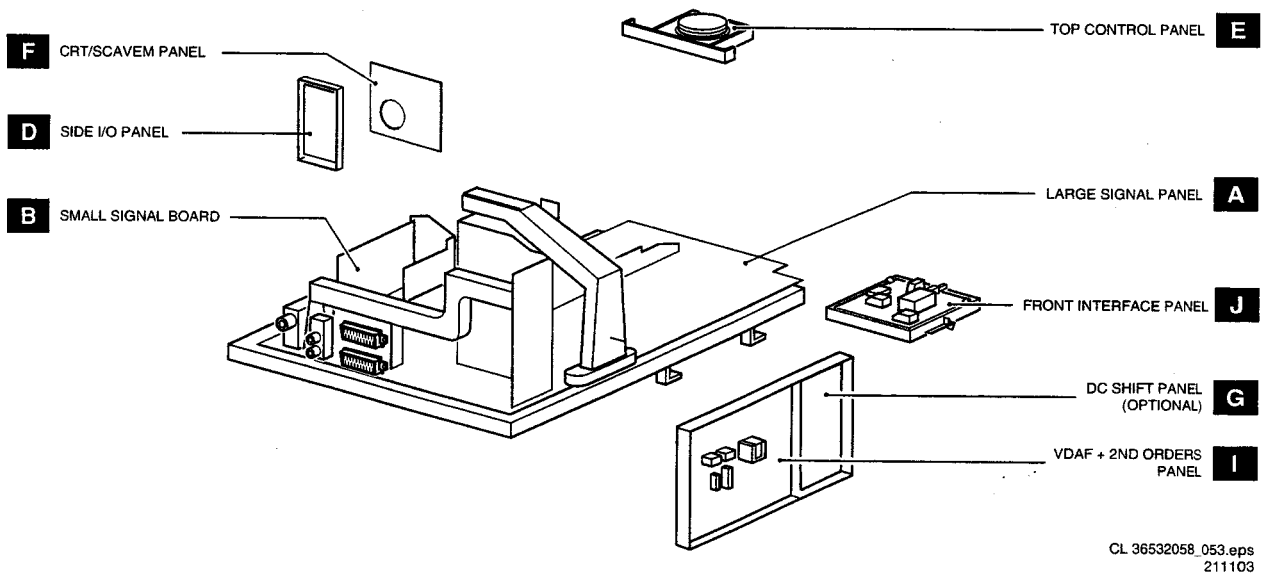


Figure 1-5 PWB location

2. Safety and Maintenance Instructions, Warnings, and Notes

2.1 Safety Instructions

Safety regulations require that **during** a repair:

- Due to the chassis concept, a very large part of the circuitry (incl. deflection) is 'hot'. Therefore, connect the set to the mains via an isolation transformer.
- Replace safety components, indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.
- Wear safety goggles when you replace the CRT.

Safety regulations require that **after** a repair, you must return the set in its original condition. Pay, in particular, attention to the following points:

- General repair instruction: as a strict precaution, we advise you to re-solder the solder connections through which the horizontal deflection current is flowing. In particular this is valid for the:
  1. Pins of the line output transformer (LOT).
  2. Fly-back capacitor(s).
  3. S-correction capacitor(s).
  4. Line output transistor.
  5. Pins of the connector with wires to the deflection coil.
  6. Other components through which the deflection current flows.

Note: This re-soldering is advised to prevent bad connections due to metal fatigue in solder connections, and is therefore only necessary for television sets more than two years old.

- Check the insulation of the mains cord for external damage.
- Check the strain relief of the mains cord for proper function, to prevent the cord from touching the CRT, hot components, or heat sinks.
- Check the electrical DC resistance between the mains plug and the secondary side (only for sets that have an isolated power supply). Do this as follows:
  1. Unplug the mains cord and connect a wire between the two pins of the mains plug.
  2. Turn on the main power switch (keep the mains cord unplugged!).
  3. Measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection of the set. The reading should be between 4.5 Mohm and 12 Mohm.
  4. Switch the TV 'off' and remove the wire between the two pins of the mains plug.
- Check the cabinet for defects, to prevent the possibility of the customer touching any internal parts.

2.2 Maintenance Instructions

We recommend a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:

- When a customer uses the set under normal circumstances, for example in a living room, the recommended interval is three to five years.
- When a customer uses the set in an environment with higher dust, grease, or moisture levels, for example in a kitchen, the recommended interval is one year.
- The maintenance inspection includes the following actions:
  1. Perform the 'general repair instruction' noted above.
  2. Clean the power supply and deflection circuitry on the chassis.
  3. Clean the picture tube panel and the neck of the picture tube.

2.3 Warnings

- In order to prevent damage to ICs and transistors, avoid all high voltage flashovers. In order to prevent damage to the picture tube, use the method shown in Fig. 2-1, to discharge the picture tube. Use a high voltage probe and a multi-meter (position V_dc). Discharge until the meter reading is 0 V (after approx. 30 s).

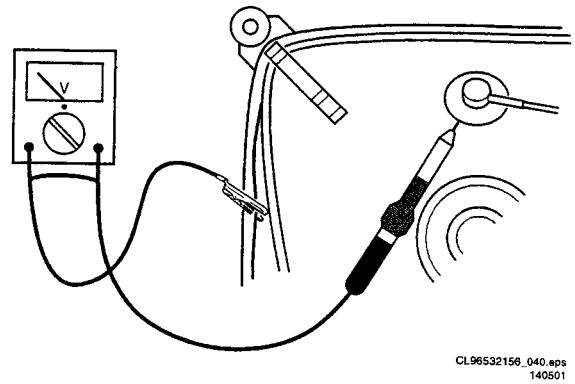


Figure 2-1 Discharge picture tube

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD, ⚠). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this potential. Available ESD protection equipment:
  - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and ground cable) 4822 310 10671.
  - Wristband tester 4822 344 13999.
- Together with the deflection unit and any multi-pole unit, flat square picture tubes form an integrated unit. The deflection and the multi-pole units are set optimally at the factory. We do not recommend adjusting this unit during repair.
- Be careful during measurements in the high voltage section and on the picture tube.
- Never replace modules or other components while the unit is 'on'.
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.4 Notes

2.4.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the tested area of circuitry.
- The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz (PAL) or 61.25 MHz (NTSC, channel 3).
- Where necessary, measure the waveforms and voltages with (📡) and without (📡) aerial signal. Measure the voltages in the power supply section both in normal operation (⏻) and in standby (⏻). These values are indicated by means of the appropriate symbols.

- The picture tube panel has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.
- Manufactured under license from Dolby Laboratories. 'Dolby', 'Pro Logic' and the 'double-D symbol', are trademarks of Dolby Laboratories.

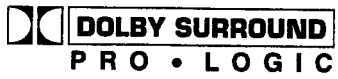


Figure 2-2 Dolby PL Symbol

2.4.2 Schematic Notes

- All resistor values are in ohms and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are expressed in micro-farads (µ= x 10^-6), nano-farads (n= x 10^-9), or pico-farads (p= x 10^-12).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Electrical Replacement Parts List. Therefore, always check this list when there is any doubt.

2.4.3 Rework on BGA (Ball Grid Array) ICs

General

Although (LF)BGA assembly yields are very high, there may still be a requirement for component rework. By rework, we mean the process of removing the component from the PWB and replacing it with a new component. If an (LF)BGA is removed from a PWB, the solder balls of the component are deformed drastically so the removed (LF)BGA has to be discarded.

Device removal

As is the case with any component that, it is essential when removing an (LF)BGA, the board, tracks, solder lands, or surrounding components are not damaged. To remove an (LF)BGA, the board must be uniformly heated to a temperature close to the reflow soldering temperature. A uniform temperature reduces the chance of warping the PWB.
To do this, we recommend that the board is heated until it is certain that all the joints are molten. Then carefully pull the component off the board with a vacuum nozzle. For the appropriate temperature profiles, see the IC data sheet.

Area preparation

When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA.
Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent.
After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF)BGA.
Note: Do not apply solder paste, as this has shown to result in problems during re-soldering.

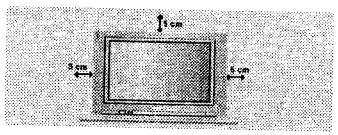
Device replacement

The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers.
To reflow the solder, apply a temperature profile according to the *IC data sheet*. So as not to damage neighbouring components, it may be necessary to reduce some temperatures and times

3. Directions for Use

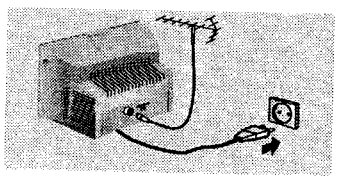
Installing your television set

❶ Positioning the television set



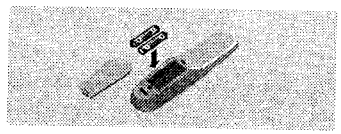
Place your TV on a solid, stable surface, leaving a space of at least 5 cm around the appliance.
To avoid accidents, do not put anything on the set such as a cloth or cover, a container full of liquid (vase) or a heat source (lamp).
The set must not be exposed to water.

❷ Connections



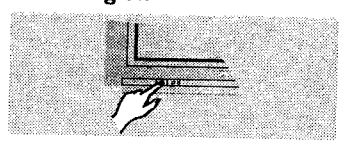
- Insert the aerial plug into the ⊓ socket at the rear of the set.
  If you are using an indoor aerial, reception may be difficult in certain conditions. You can improve reception by rotating the aerial. If the reception remains poor, you will need to use an external aerial.
- Insert the mains plug into a wall socket (220-240 V / 50 Hz).

❸ Remote control



Insert the two R6-type batteries (supplied) making sure that they are the right way round.
Check that the mode selector is set to TV.
The batteries supplied with this appliance do not contain mercury or nickel cadmium.
If you have access to a recycling facility, please do not discard your used batteries (if in doubt, consult your dealer). When the batteries are replaced, use the same type.

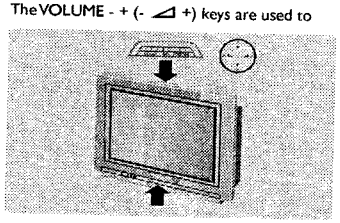
❹ Switching on



To switch on the set, press the on/off key.
A red indicator comes on and the screen lights up. Go straight to the chapter Quick installation on page 4.
If the television remains in standby mode, press **P** ⊕ on the remote control.
The indicator will flash when you use the remote control.

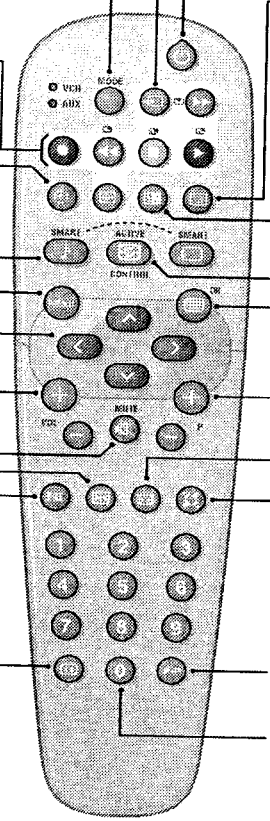
The keys on the TV set

The television set has 4 or 5 keys which are located on the front or the top of the set depending on the model.
The VOLUME - + (- ◿ +) keys are used to



adjust sound levels. The PROGRAM - + (- **P** +) keys are used to select the required programmes.
To access the menus, simultaneously hold down the ◿ - and ◿ + keys (or MENU key).
The PROGRAM - + keys may then be used to select an adjustment and the - ◿ + keys to make that adjustment.
To exit from the menus, hold down the 2 ◿ - and ◿ + keys (or MENU key).
Note: when the **Child Lock** *function is activated, these keys are unavailable (refer to* **Features** *menu on page 7).*

Remote control keys



Select peripherals (p.10)
Press several times to select the required EXT connector.

Mode selector (p. 11)
To activate the remote control in TV, VCR (video recorder) or DVD mode.

Teletext keys (p. 8) or VCR / DVD (p.11)

Sleeptimer
To select the length of time before the set automatically switches to standby (from 0 to 240 minutes)

Smart picture and sound
Used to access a series of predefined picture and sound settings.
The **personal** *position relates to settings selected from the menus.*

Menu
To call up or exit the menus.

Cursor
These 4 keys are used to move around the menus.

Volume
To adjust the sound level

Mute
To mute or restore the sound.

Freeze the picture

Sound mode
Used to force programmes in **Stereo** and **Nicam Stereo** to **Mono** or, for bilingual programmes, to choose between **Dual I** or **Dual II**.
The **Mono** *indication is red when in forced position.*

Screen information
To display / remove the programme number, the name (if it exists), the time, the sound mode and the time remaining on the timer. Hold down for 5 seconds to permanently display the programme number on the screen. The volume level and the smart control adjustments are then displayed each time they are used.

Standby
To set the TV to standby mode. To switch the TV set on again, press ⏻, P ⊖ ⊕ or 0 9.

List of programmes
To display/clear the list of programmes. Use the keys ⌃⌄ to select a programme and the key ⟩ to display it.
The symbol 🔒 is displayed alongside all programmes which are locked (p.7).

Dual screen *(according to the version)*
To activate/disable the display on 2 screens. The second screen displays teletext.

Active Control *(according to the version)*
Optimizes the quality of the picture according to the quality of reception.

Teletext (p. 8)

Programme selection
To access the next or previous TV channel from the list of Favourite Programmes (see p. 5).

16:9 Format (p. 9)

Surround Sound
To activate / deactivate the surround sound effect. In stereo, this gives the impression that the speakers are further apart. For models equipped with Virtual Dolby Surround*, you can experience Dolby Surround Pro Logic sound effects. In mono, a stereo spatial effect is simulated.

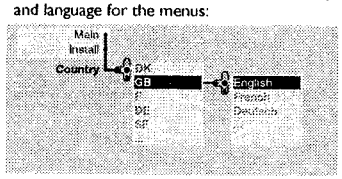
Previous programme
To return to the previous programme.

Digit keys
Direct access to the programmes. For a 2 digit programme, enter the 2nd digit before the dash disappears.

* *Manufactured under license from Dolby Laboratories.*
"Dolby" and the double-D symbols are trademarks of Dolby Laboratories.

Quick installation

When you turn on the TV set for the first time, a menu is displayed on screen.
This menu prompts you to select the country and language for the menus:



If the menu is not displayed, press and hold down the ◿- and ◿+ keys on the TV set for 5 seconds to display the menu.

❶ Use the ⌃⌄ keys on the remote control to select your country and validate with ⟩.
If your country does not appear in the list, select choice "..."

❷ Next select your language using the ⌃⌄ keys and validate with ⟩.

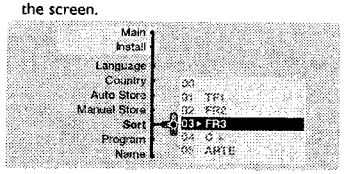
❸ The search starts automatically. All the available TV programmes will be stored. This operation takes a few minutes.
The display shows the progress of the search and the number of programs found. At the end of the search, the menu disappears.
To exit or interrupt the search, press MENU. If no programme is found, consult the possible solutions p. 12.

❹ If the transmitter or cable network sends the automatic sort signal, the programs will be numbered correctly. In this case, the installation is complete.

❺ If this is not the case, you need to use the **Sort** menu to number the programs correctly.
Some transmitters or cable networks broadcast their own sort parameters (region, language, etc.). In this case, indicate your choice using the ⌃⌄ keys and validate with ⟩.

Program sort

❶ Press key MENU. The **Main menu** is displayed on the screen.



❷ With the cursor, select the **Install** menu followed by the **Sort** menu.

❸ Select the programme you want to move using the ⌃⌄ keys and press ⟩.

❹ Then use the ⌃⌄ keys to select the new number and validate with ⟨.

❺ Repeat steps ❸ and ❹ for each program you wish to renumber.

❻ To quit the menus, press ⊞.

Program name

If required, you can give a name to the programmes and external connectors.
Note: on installation, the programs are named automatically when an identification signal is sent.

❶ Press the MENU key.

❷ With the cursor, select the **Install** menu, then **Name**

❸ Use the ⊖ **P** ⊕ keys to select the programme to name or rename.

❹ Use the ⟨⟩ keys to move around the name display area (5 characters) and the ⌃⌄ keys to select the characters.

❺ When the name has been entered, use the ⟨ key to exit. The name is stored.

❻ Repeat steps ❸ to ❺ for each programme you wish to name.

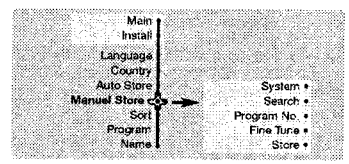
❼ To quit the menus, press ⊞.

Manual store

This menu is used to store the programmes one at a time.

❶ Press the MENU key.

❷ With the cursor, select the **Install** menu then **Manual store**:



❸ **System:** select **Europe** (automatic detection*) or **Western Europe** (BG standard), **Eastern Europe** (DK standard), **United Kingdom** (I standard) or **France** (LL' standard).

** Except for France (LL' standard), you must select choice* **France**.

❹ **Search:** press ⟩. The search starts. Once a programme is found, the scanning stops and its name is displayed (when available). Go to the next step. If you know the frequency of the required programme, this can be entered directly using the ⓪ to ⑨ keys.
If no picture is found, consult the possible solutions (p. 12).

❺ **Program No.:** enter the required number with the ⟨⟩ or ⓪ to ⑨ keys.

❻ **Fine Tune:** if the reception is not satisfactory, adjust using the ⟨⟩ keys.

❼ **Store:** press ⟩. The program is stored.

❽ Repeat steps ❹ to ❼ for each programme to store.

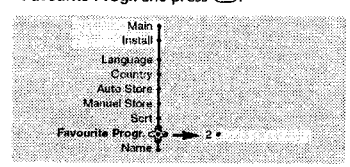
❾ To quit the menus, press ⊞.

Favourite programmes

This menu allows you to select the programmes to be accessed with the ⊖ **P** ⊕ key.

❶ Press the MENU key.

❷ With the cursor, select the **Install** menu then **Favourite Progr.** and press ⟩.



The list of favourite programmes is displayed. The programmes that were stored at installation will automatically appear on this list.

❸ Use the up/downcursor to select the required programme.

❹ Use the left/right cursor to add or remove a programme from the list.

❺ Run through steps ❸ and ❹ for each programme to be added or removed from the list.

❻ To exit, press ⊞ several times.

Other settings in the Install menu

❶ Press the MENU key and select the **Install** menu:

❷ **Language:** to change the display language for the menus.

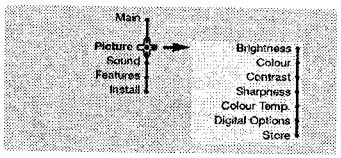
❸ **Country:** to select your country (**GB** for Great Britain).
This setting is used for the search, automatic programme sort and teletext display. If your country does not appear in the list, select "..."

❹ **Auto Store:** to start automatic search for all programmes available in your region. If the transmitter or cable network sends the automatic sort signal, the programmes will be numbered correctly. If this is not the case, you need to use the Sort menu to renumber the programmes (see p. 4).
Some transmitters or cable networks broadcast their own sort parameters (region, language, etc.). In this case, indicate your choice using the ⌃⌄ keys and validate with ⟩. To quit or interrupt the search, press MENU. If no picture is found, consult the possible solutions (p. 12).

❺ To quit the menus, press ⊞.

Picture settings

❶ Press (MENU) then (›). The **Picture** menu is displayed:



❷ Use the (^)(v) keys to select a setting and the (‹)(›) keys to adjust.
Note: during the picture adjustment, only the selected line remains displayed. Press (^)(v) to display the menu again.

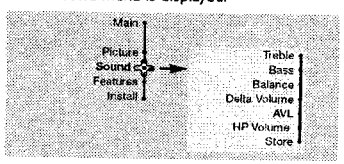
❸ Once the adjustments have been made, select **Store** and press (›) to store them.
Press (⊡) to exit.

Description of the adjustments:

- **Brightness:** this changes picture brilliance.
- **Colour:** this changes the intensity of the colour.
- **Contrast:** this changes the difference between the light and dark tones.
- **Sharpness:** this changes the picture definition.
- **Colour Temp.:** this changes the colour rendering: **Cold** (bluer), **Normal** (balanced) or **Warm** (redder).
- **Digital Options:**
  - **100 Hz:** 100 Hz processing.
  - **Double lines:** doubling of vertical resolution which removes visible picture lines. *Advised for NTSC (60Hz) pictures.*
- **Store:** to store the picture adjustments and settings.

Sound adjustments

❶ Press (MENU), select Sound ((v)) and press (›). The **Sound** menu is displayed:



❷ Use the (^)(v) keys to select a setting and the (‹)(›) keys to adjust.

❸ Once the adjustments have been made, select Store and press (›) to store these changes.

❹ To quit the menus, press (⊡).

Description of the settings:

- **Treble**: this alters the high frequency sounds.
- **Bass:** this alters the low frequency sounds.
- Balance: this balances the sound on the left and right speakers.
- **Delta Volume** : this is used to compensate any volume discrepancies between the different programs or EXT sockets. This setting is available for programs 0 to 40 and the EXT sockets.
- **AVL** (Automatic Volume Leveller): this is used to limit increases in sound, especially on program change or advertising slots.
- **HP Volume** : allows you to adjust the headphones volume independently from the loud-speakers on the TV set.
- **Store:** this is used to store the sound settings.

Feature settings

❶ Press (MENU), select **Features** ((v)) and press (›). You can adjust:

❷ **Timer, Child Lock** and **Parental Cont.**: see next page

❸ **Dynamic NR: Min, Med** (optimum position), **Max** or **Off:** attenuates picture noise (snow) in difficult reception conditions.

❹ **Rotation** (only available on very large screen sets): large screen sets are sensitive to terrestrial magnetic field variations. This setting is used to compensate for this by adjusting the picture rotation.

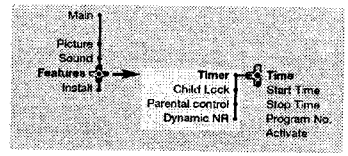
❺ To quit the menus, press (⊡).

Timer function

This menu lets you use the TV set as an alarm.

❶ Press the (MENU) key.

❷ With the cursor, select the **Features** menu then **Timer** :



❸ **Time:** enter the current time.
Note: the time is updated automatically each time the TV set is switched on via the teletext information on programme 1. If this program does not have teletext, the update will not take place.

❹ **Start Time:** enter the start time.

❺ **Stop Time:** enter the standby time.

❻ **Program No.:** enter the number of the programme for the wake-up alarm.

❼ **Activate:** the settings include:
- **Once** for a single alarm,
- **Daily** for each day,
- **Stop** to cancel.

❽ Press (⏻) to put the TV set in standby.
It will automatically come on at the time programmed. If you leave the TV set on, it will just change programmes at the time entered (and will go to standby mode at the **Stop Time**).
By combining the **TV lock** *and* **Timer** *functions, you can restrict the period during which the TV set is used, for example by your children.*

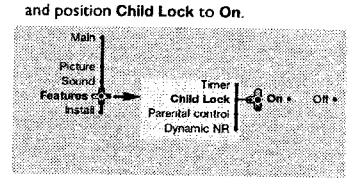
TV lock

You can block certain programs or inhibit use of the TV set completely by locking the keys.

Child lock

❶ Press (MENU).

❷ With the cursor, select the **Features** menu and position **Child Lock** to **On**.



❸ Turn off the TV set and hide the remote control. The TV set cannot be used (except via the remote control).

❹ To cancel: position **Child Lock** to **Off**.

Parental control

❶ Press the (MENU) key, select the **Features** menu then **Parental Cont.**:

❷ You must enter your secret access code. The first time you enter this, enter code 0711 twice and then enter your new code choice. The menu is displayed.

❸ **Parental Cont.:** Use the (^)(v) keys to select the TV programme required and validate with (›). The 🔒 symbol will be displayed opposite the programmes or sockets that are locked. From now on, to view a locked programme, you must enter your secret code, otherwise the screen will stay blank.
The access to the **Install** *menu is also locked. Caution, for encrypted programs using an external decoder, you must lock the corresponding EXT socket.*

❹ **Change code:** this allows you to enter a new 4 digit code. Confirm your new code by entering it a second time.
If you have forgotten your secret code, enter the universal code 0711 twice.

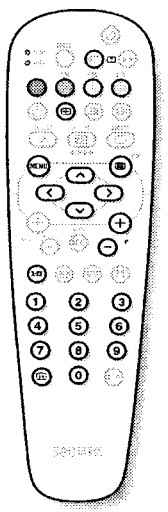
❺ **Unlock all:** this is used to unlock all locked programmes.

❻ **Lock All:** this is used to lock all the TV programmes and EXT connectors.

❼ Press the (⊡) key to quit.

Teletext

Teletext is an information system broadcast by certain channels which can be consulted like a newspaper. It also offers access to subtitles for viewers with hearing problems or who are not familiar with the transmission language (cable networks, satellite channels, etc.).

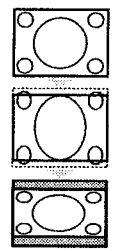


Press :	You will obtain:
Teletext call	This is used to call teletext, change to transparent mode and then exit. The summary appears with a list of items that can be accessed. Each item has a corresponding 3 digit page number. *If the channel selected does not broadcast teletext, the indication 100 will be displayed and the screen will remain blank (in this case, exit teletext and select another channel).*
Selecting a page	Enter the number of the page required using the 0 to 9 or − P + keys, ⌃⌄. Example: page 120, enter 1 2 0. The number is displayed top left, the counter turns and then the page is displayed. Repeat this operation to view another page. *If the counter continues to search, this means that the page is not transmitted. Select another number.*
Direct access to the items	Coloured areas are displayed at the bottom of the screen. The 4 coloured keys are used to access the items or corresponding pages. *The coloured areas flash when the item or the page is not yet available.*
Contents	This returns you to the contents page (usually page 100).
Direct selection of sub-pages	Certain pages contain sub-pages (for example, page 120 contains sub-pages 1/3, 2/3 and 3/3). If this is the case, the page number is displayed in green, preceded by the symbol ▶, ◀ or ◀ ▶. Use the keys 〈〉 to directly access the sub-pages of your choice.
Enlarge a page	This allows you to display the top or bottom part of the page and then return to normal size.
Double page teletext *(only available on certain versions)*	To activate or deactivate the double page teletext display mode. The active page is displayed on the left and the following page is displayed on the right. Press if you want to hold a page (i.e. the contents page). The active page is then displayed on the right. To return to normal mode, press I-II.
Hidden information	To display or hide the concealed information (games solutions).
Favourite pages	Instead of the standard coloured areas displayed at the bottom of the screen, you can store 4 favourite pages on the first 40 channels which can then be accessed using the coloured keys (red, green, yellow, blue). Once set, these favourite pages will become the default every time tetetext is selected. 1 Press the MENU key to change to favourite pages mode. 2 Display the teletext page that you want to store. 3 Press the coloured key of your choice for 3 seconds. The page is now stored. 4 Repeat the operation with the other coloured keys. 5 Now when you consult teletext, your favourite pages will appear in colour at the bottom of the screen. To temporaly retrieve the standard items, press MENU. *To clear everything and return the standard items as the default press LIST for 5 seconds.*

16:9 Formats

The pictures you receive may be transmitted in 16:9 format (wide screen) or 4:3 format (conventional screen). 4:3 pictures sometimes have a black band at the top and bottom of the screen (letterbox format). This function allows you to optimise the picture display on screen.

If your television is equipped with a 4:3 screen.



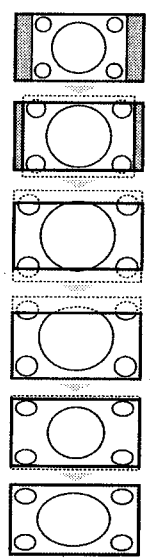
Press the 16:9 key (or ⌃⌄) to select the different modes:

4:3
The picture is reproduced in 4:3 format.

Expand 4:3
The picture is enlarged vertically. This mode is used to cancell the black bands when watching a programme in letterbox format.

Compress 16:9
The picture is compressed vertically into 16:9 format.

If your television is equipped with a 16:9 screen.



Press the 16:9 key (or 〈〉) to select the different modes:
This TV set is also equipped with automatic switching which will select the correct-screen format, provided the specific signals are transmitted with the programmes.

4:3
The picture is reproduced in 4:3 format and a black band is displayed on either side of the picture. The picture may be progressively enlarged using the ⌃⌄ keys.

Zoom 14:9
The picture is enlarged to 14:9 format, a thin black band remains on both sides of the picture. The ⌃⌄ keys allow you to compress and move the image vertically to view the top or bottom of the picture (subtitles).

Zoom 16:9
The picture is enlarged to 16:9 format. This mode is recommended when displaying pictures which have black bands at the top and bottom (letterbox format).
Use the ⌃⌄ keys if you wish to compress and move the image vertically to view the top or bottom of the picture.

Subtitle Zoom
This mode is used to display 4:3 pictures using the full surface of the screen leaving the sub-titles visible.
Use the ⌃⌄ keys to increase or decrease the compression at the bottom of the screen.

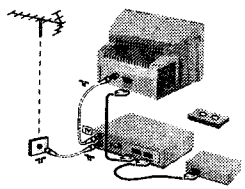
Super Wide
This mode is used to display 4:3 pictures using the full surface of the screen by enlarging the sides of the picture. The ⌃⌄ keys allow you to scroll the image up or down the screen.

Widescreen
This mode restores the correct proportions of pictures transmitted in 16:9 using full screen display.

Connecting peripheral equipment

The television has 2 external sockets situated at the back of the set (EXT1 and EXT2).
The EXT1 socket has audio, CVBS/RGB inputs and audio, CVBS outputs.
The EXT2 socket has audio, CVBS/S-VHS inputs and audio, CVBS outputs.

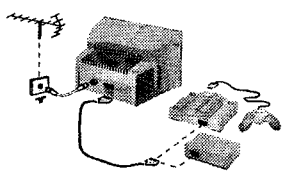
Video recorder



Carry out the connections shown opposite, using a good quality euroconnector cable.
If your video recorder does not have a euroconnector socket, the only connection possible is via the aerial cable. You will therefore need to tune in your video recorder's test signal and assign it programme number 0 (refer to manual store, p. 5).
To reproduce the video recorder picture, press (0).

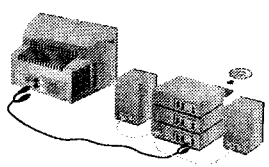
Video recorder with decoder
Connect the decoder to the second euroconnector socket of the video recorder. You will then be able to record scrambled transmissions.

Other equipment

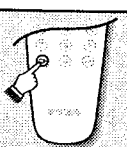


Satellite receiver, decoder, CDV, games, etc.
Carry out the connections shown opposite.
To optimise picture quality, connect the equipment which produces the RGB signals (digital decoder, games, etc.) to EXT1, and the equipment which produces the S-VHS signals (S-VHS and Hi-8 video recorders, certain DVD drives) to EXT2 and all other equipment to either EXT1 or EXT2.

Amplifier *(only available on certain versions)*

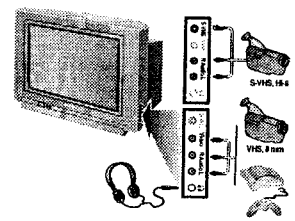


To connect to a hi-fi system, use an audio connection cable and connect the "L" and "R" outputs on the TV set to the "AUDIO IN" "L" and "R" input on your hi-fi amplifier.



To select connected equipment
Press the (⇨) key to select **EXT1, EXT2, S-VHS2** (S-VHS signals from the EXT2 socket) and **EXT3** for connections on the front panel.
Most equipment (decoder, video recorder) carries out the switching itself.

Side connections

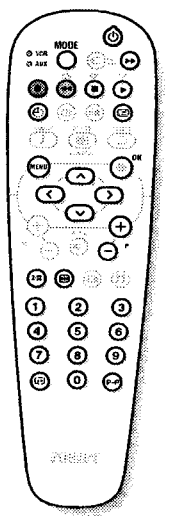


Make the connections as shown opposite.
With the (⇨) key, select **EXT3**.
For a monophonic device, connect the audio signal to the AUDIO L input. Use the (I-II) *key to reproduce the sound on the left and right speakers of the TV set.*

Headphones
Press the (✱) key to mute the sound on the TV set (see also sound settings, page 6).
The headphone impedance must be between 32 and 600 Ohms.

Video recorder or DVD keys

The remote control lets you control the main functions of the VCR or DVD.



Press the **MODE** key to select the required mode : **VCR** (video recorder) or **AUX (DVD)**. The remote control indicator lights up to display the selected mode. It switches off automatically after 20 seconds if left idle.
The remote control automatically returns to TV mode.
The following keys are operational, depending on the equipment :

- (⏻) standby,
- (◀◀) fast rewind,
- (▶▶) fast forward,
- (●) recording,
- (■) stop,
- (▶) play,
- (⏲) VCR timer,
- (☰) DVD : subtitling language
- (MENU) menu,
- **cursor** navigation and adjustments,
- **OK** validation,
- (0)(9) digit keys,
- (−) P (+) programme selection,
- (I-II) audio selection.
  pause,
- (OSD) OSD menu,
- (P•P) DVD : T-C function / VCR : index function.

The remote control is compatible with all video recorders using the RC5 standard and all DVDs using the RC6 standard.

Tips

Poor reception
The proximity of mountains or high buildings may be responsible for ghost pictures, echoing or shadows. In this case, try manually adjusting your picture: see **Fine Tuning** (p.5) or modify the orientation of the outside aerial.
Does your antenna enable you to receive broadcasts in this frequency range (UHF or VHF band)?
In the event of difficult reception (snowy picture) switch the **Dynamic NR** on the **Features** menu to **ON**. (p. 6).

No picture
If the television does not switch on, please press the standby key ⏻ (located on the remote control) twice.
Have you connected the aerial socket properly? Have you chosen the right system? (p. 5).
Poorly connected euroconnector cables or aerial sockets are often the cause of picture or sound problems (sometimes the connectors can become half disconnected if the TV set is moved or turned). Check all connections.

Peripheral equipment gives a black and white picture
To play a video cassette, check that it has been recorded under the same standard (PAL, SECAM, NTSC) which can be replayed by the video recorder.

The remote control no longer works.
Check that the mode selector on the side of the remote control is set to TV.

No sound
If on certain channels you receive a picture but no sound, this means that you do not have the correct TV system. Modify the **System** setting (p. 5).

Teletext
Are certain characters not displayed correctly? Check that the **Country** setting has been positioned correctly (p.5).

Remote control
The TV set does not react to the remote control: the indicator on the set no longer flashes when you use the remote control? Replace the batteries.

Standby
When you switch the TV set on it remains in standby mode and the indication **Locked** is displayed when you use the keys on the TV set?
The **Child Lock** function is switched **On** (p. 7).
If the set receives no signal for 15 mins, it automatically goes into standby mode.
To save power, your set is fitted with components that give it a very low power consumption when in standby mode (less than 1 W).

Still no results?
If your TV set breaks down, never attempt to repair it yourself: contact your dealer's after-sales service.

Cleaning the set
Only use a clean, soft and lint-free cloth to clean the screen and the casing of your set. Do not use alcohol-based or solvent-based products.

Glossary

RGB Signals: These are 3 Red, Green and Blue video signals which directly drive the red, green and blue emitters in the cathode ray tube. Using these signals provides better picture quality.

NICAM sound: Process by which digital sound can be transmitted.

System: Television pictures are not broadcast in the same way in all countries. There are different standards: BG, DK, I, and L L'. The SYSTEM setting (p. 6) is used to select these different standards. This is not to be confused with PAL or SECAM colour coding. Pal is used in most countries in Europe, Secam in France, Russia and most African countries. The United States and Japan use a different system called NTSC.

16:9: Refers to the ration between the length and height of the screen.
Wide screen televisions have a ration of 16/9, conventional screen TV sets have a ration of 4/3.

Personal Notes:

4. Mechanical Instructions

Index of this chapter:
1. Service connector
2. Set Disassembly
3. Service Positions
4. Assy / Board Removal
5. Set Reassembly

Note: Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Service Connector (for ComPair)

For service diagnostics with ComPair, it is not necessary to disassemble the set. You only have to connect the ComPair interface box, via the appropriate cable, to the service connector (on the rear of the set, see figure 1-2), and start the program (see also chapter 5 "Service Modes, Error Codes, and Fault Finding ").

4.2 Set Disassembly

Follow the disassemble instructions in described order.

4.2.1 Rear Cover Removal

Warning: disconnect the mains power cord before you remove the rear cover.

1. Remove all the fixation screws of the rear cover.
2. Now the rear cover can be removed.

4.3 Service Positions

This chassis has several predefined service positions, for better accessibility. They are explained below in more detail.

4.3.1 Large Signal Panel (LSP)

Component Side LSP

For better accessibility of the LSP, do the following (see Figure "Service position 1"):
1. Remove the LSP-bracket from the bottom tray by pulling it backwards.
2. Hook the bracket in the first row of fixation holes of the bottom tray. In other words, reposition the bracket from [1] to [2].

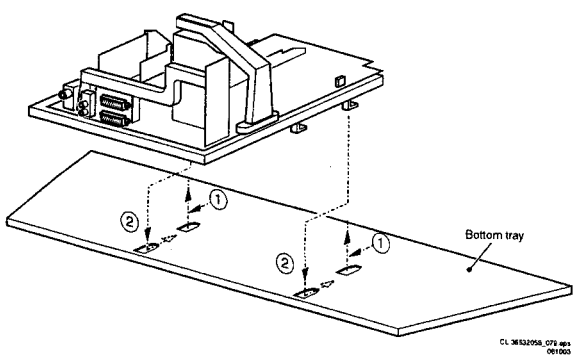


Figure 4-1 Service position 1

Solder Side LSP

To get access to the bottom side (solder side) of the LSP, do the following (see figure 4-1):
1. Remove the DAF-module (see paragraph "DAF Assy/ Panel" below).
2. Remove the Mains Switch-module (see paragraph "Mains Switch Assy/Panel" below).
3. Remove the cable from the side I/O panel.
4. Release some wiring from their fixation clamps, in order to get room for repositioning the LSP.
5. Flip the LSP 90 degrees clockwise [2], and place it in the fixation hole at the left side of the bottom tray [3].
6. Pull the LSP forward to fix it.

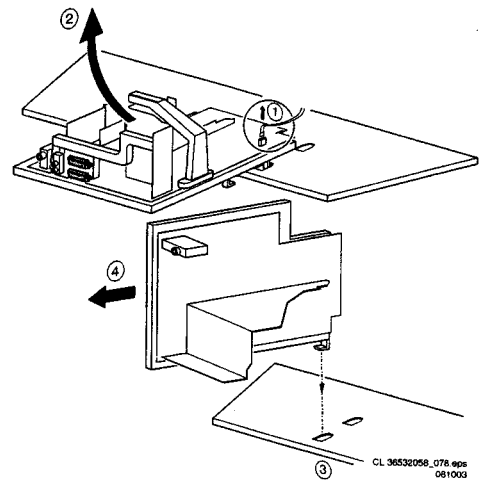


Figure 4-2 Service position 2

4.3.2 Small Signal Board (SSB)

In fact, there is no predefined service position for the SSB. Most test points are located on the A-side (side that is facing the tuner). If you have to replace ICs, you must take the complete SSB module out of the SIMM-connector.

Notes:
- For better access to the SSB, it is possible to order an "extension tool" with cables. You can use this service extension tool to connect a Small Signal Board (SSB) of an a02, A10, or EMG (EMx) chassis, via two "IDE" cables to the SIMM connector in the set. In this way, you can service the SSB more easily outside the TV set. You can order this tool under 12nc: 9965 000 14526.
- If necessary for the measurement, you can put the LSP in "service position 2" (as described above).

4.4 Assy / Board Removal

Sometimes, it can be necessary to swap a complete assy or Printed Wiring Board (PWB). How that can be done is explained below.

4.4.1 Top Control Assy/Panel

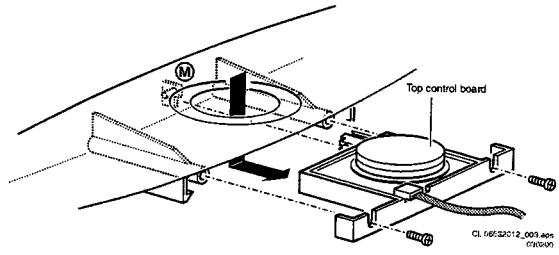


Figure 4-3 Top control panel

1. Remove the two fixation screws, which hold the panel.
2. Pull the board backward (w.o.w. release it from the front hinge).
3. The board can easily be lifted out of the bracket after releasing the two fixation clamps at the connector side.

4.4.2 Side I/O Assy and Panel

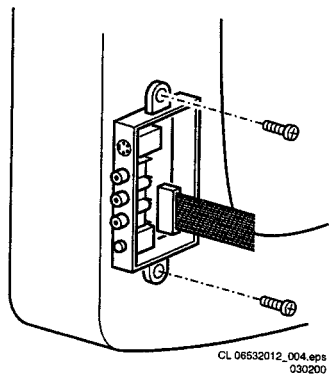


Figure 4-4 Side-I/O panel

1. The complete Side I/O-assembly can easily be removed by unscrewing the two fixation screws.
2. The board can easily be lifted out of the bracket after releasing the two fixation clamps.

4.4.3 Mains Switch Assy/Panel

4.4.4 Accessing the Mains Switch/LED panel

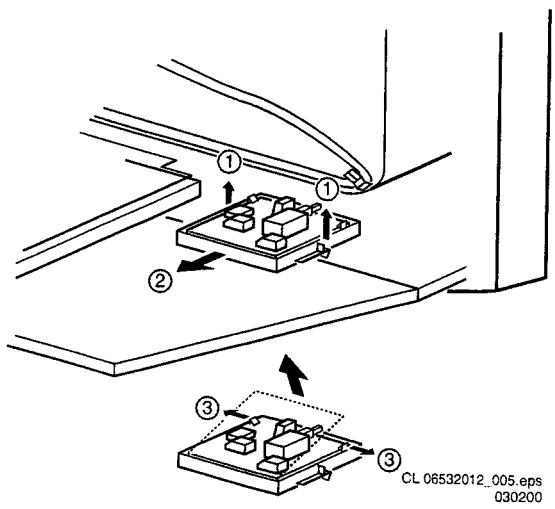


Figure 4-5 Mains Switch/LED panel

1. Release the two fixation clamps (1) by pushing them upward.
2. At the same time, the complete assy must be pulled backward (2).
3. If the board has to be removed, release the two clamps at the sides of the bracket and lift panel out (3).

4.4.5 DAF Assy/Panel

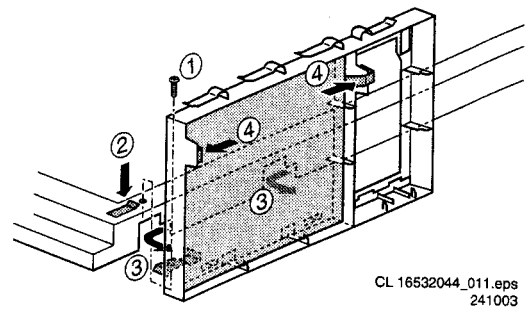


Figure 4-6 DAF-module

1. Remove the fixation screw [1] (if present).
2. Push down the fixation clamp [2], and pull the complete bracket at the same time away from the CRT [3]. The module is now free from the LSP-bracket.

4.4.6 Small Signal Board (SSB)

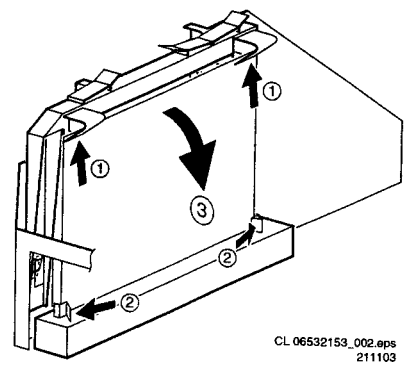


Figure 4-7 SSB removal

1. Push the top of the SSB towards the LOT [1].
2. Due to the pressure, the two metal clamps at both sides of the SIMM-connector will release [2].
3. Take the complete SSB out [3].

4.4.7 Large Signal Panel (LSP)

1. Remove the SSB (see paragraph "Small Signal Board (SSB)" above).
2. Disconnect the necessary cables.
3. Remove the fixation screw, which is located nearby the SIMM-connector.
4. Release the fixation clamps on the left of the LSP-bracket (the board hinges at the right side).
5. Remove the board from the bracket.

4.5 Set Re-assembly

To re-assemble the whole set, do all processes in reverse order.
Be sure that, before the rear cover is mounted:

- The mains cord is mounted correctly in its guiding brackets.
- All wires/cables are returned in their original positions. This is very important due to the large "hot" area of the set

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:
1. Test points
2. Service Modes
3. Problems and solving tips (related to CSM)
4. ComPair
5. Error Codes
6. The blinking LED procedure
7. Protections
8. Repair tips
9. Software downloading

5.1 Test Points

See chapter 6 " Block Diagrams, Testpoint Overview, and Waveforms".

Perform measurements under the following conditions:
- Service Default Mode.
- Video: colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

Service Default Mode (SDM) and Service Alignment Mode (SAM) offer several features for the service technician, while the Customer Service Mode (CSM) is used for communication between a Philips Customer Care Centre (P3C) and a customer.

There is also the option of using ComPair, a hardware interface between a computer (see requirements below) and the TV chassis. It offers the ability of structured troubleshooting, test pattern generation, error code reading, software version readout, and software upgrading.
Minimum requirements: a Pentium processor, Windows 95/ 98, and a CD-ROM drive (see also paragraph "ComPair").

5.2.1 Service Default Mode (SDM)

Purpose
- To create a pre-defined setting, to get the same measurement results as given in this manual.
- To override SW protections (only when SDM is activated via shorting the SDM pins on the SSB).
- To start the blinking LED procedure.
- Inspection of error buffer, life timer, and software version.

Specifications
- Tuning frequency: 475.25 MHz for PAL/SECAM.
- Colour system: SECAM L for France or PAL B/G for the rest of Europe.
- All picture settings at 50 % (brightness, colour, contrast).
- All sound settings at 50 %, except volume at 25 %.
- All service-unfriendly modes (if present) are disabled, like:
  - (Sleep) timer.
  - Child/parental lock.
  - Blue mute.
  - Automatic volume limiter (AVL).
  - Auto switch-off (when no video signal was received for 10 minutes).
  - Skip/blank of non-favourite pre-sets.
  - Hotel or hospital mode.
  - Local keyboard block.
  - Smart modes.
  - Auto store of personal presets.
  - Auto user menu time-out.

How to Activate SDM
Use one of the following methods:
- Use the standard RC-transmitter and key in the code "062596", directly followed by the "MENU" button.
  Note: It is possible that, together with the SDM, the main menu will appear. To switch it "off", push the "MENU" button again.
- Short circuit, during switch "on" of the set, the two solder pads on the SSB with the indication "FOR SERVICE". These solder pads are located at the "tuner" side of the SSB (just above the large BGA IC).
  Caution: If the SDM is activated via these pins, all the software-controlled protections are de-activated for 15 s. When these 15 s are expired, the set will shutdown to protection mode.
- Use the DST-emulation feature of ComPair.
- Use the "DEFAULT" button on the Dealer Service Tool (RC7150).

After activating this mode:
- "SDM" will appear in the upper right corner of the screen.
- Also, the error buffer, operating hours, and software version are displayed (can be toggled "on/off" with the "STATUS / OSD / [i+]" button).
- Blinking LED procedure will be started.
- All software-controlled protections are overridden for 15 s. When these 15 s are expired, the set will shutdown to protection mode.

Contents of SDM:
- **HRS.** Displays the accumulated total of operation hours (not the standby hours) in hexadecimal value.
- **SW.** Displays the date of the software and the software version of the ROM
  example: A02EB1_1.00 = AAABBC-X.YY.
  - **AAA**= chassis name.
  - **BB**= region and/or function name: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM, B= Basic, T= Top, P= PAL, N= NTSC, S= Stereo, M= Mono.
  - **C**= the language cluster number.
  - **X.Y**= the software version, where X is the main version number (different numbers are not compatible with one another) and Y is the sub version number (a higher number is always compatible with a lower number).
- **ERR** (followed by maximal 8 errors). The most recent error is displayed at the upper left (for an error explanation see paragraph "Error Codes").

How to navigate
- When you press the "MENU" button on the RC transmitter, the set will toggle between the SDM and the normal user menu (with the SDM mode still active in the background).
- When you press the "STATUS / OSD / [i+]" button on the RC transmitter, the set will toggle only display "SDM". This mode is useful when performing measurements, then the OSD info will not generate interference.

How to exit SDM
Use one of the following methods:
- Switch the set to STANDBY via a standard customer RC-transmitter (the error buffer is erased).
- Via a standard customer RC-transmitter: key in "00"-sequence (the error buffer is **not** erased).

5.2.2 Service Alignment Mode (SAM)

Purpose
- To perform alignments.
- To change option settings.
- To easily identify the used software version.
- To view operation hours.
- To display / clear the error code buffer.

Specifications
- Operating hours counter.
- Software version.
- Option settings.
- Error buffer reading and erasing.
- Software alignments.
- Disable service unfriendly modes.

How to activate SAM
Use one of the following methods:
- Via a standard RC transmitter: key in the code "062596" directly followed by the "STATUS / OSD / [i+]" button.
- Use the DST-emulation feature of ComPair.
- Press the "ALIGN" button on the DST while the set is in the normal operation

After activating this mode, "SAM" will appear in the upper right corner of the screen.

Contents of SAM:
- **HRS.** Displays the accumulated total of operation hours (not the standby hours) in hexadecimal value
  Note: every time the set is switched "on" by the mains switch or the RC, the timer is increased by 0.5.
- **SW.** Displays the software version of the ROM
  example: A02EB1_1.00 = AAABBC-X.YY.
  - **AAA**= chassis name.
  - **BB**= region and/or function name: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM, B= Basic, T= Top, P= PAL, N= NTSC, S= Stereo, M= Mono.
  - **C**= the language cluster number.
  - **X.Y**= the software version, where X is the main version number (different numbers are not compatible with one another) and Y is the sub version number (a higher number is always compatible with a lower number).
- **ERR** (followed by maximal 8 errors). The most recent error is displayed at the upper left (for an error explanation see paragraph "Error Codes").
- **CLEAR ERRORS.** When you press the "OK" button, the error buffer is reset.
- **OPTIONS.** Extra features for Service.
- **AKB.** Disable (off) or enable (on) the "black current loop" (AKB= Auto Kine Bias). For Vg2 alignment.
- **VSD.** Disable (off) or enable (on) the vertical deflection (VSD= Vertical Scan Disable).**Do not use** (will cause a protection). Is for future use.
- **TUNER.** This will activate the "TUNER" alignments sub-menu.
- **WHITE TONE.** This will activate the "WHITE TONE" alignments sub-menu.
- **GEOMETRY.** This will activate the "GEOMETRY" alignments sub-menu.
- **SOUND.** This will activate the "SOUND" alignments sub-menu.
- **SMART SETTINGS.** This will activate the "SMART SETTINGS" alignments sub-menu.
- **STORE.** This will save the new settings/alignments.
- **EEPROM TEST.** This will report if the SW checksum is OK. Convenient after SW upgrading.
- **VID RAM TEST.** This will check the continuity of the address bus and data bus of the Video RAM.
- **VG2.** This feature is not implemented yet. **Do not use.**

Note: Alignments are described in chapter 8 "Alignments".

How to navigate
- In SAM, you can select the menu items with the "CURSOR UP/DOWN" key on the RC-transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the "CURSOR UP/DOWN" key to display the next/previous menu items.
- With the "CURSOR LEFT/RIGHT" keys, it is possible to:
  - (De) activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected submenu.
- When you press the "MENU" button on the RC transmitter, the set will toggle between the SAM and the normal user menu (with the SAM mode still active in the background).

How to exit SAM
Use one of the following methods:
- Switch the set to STANDBY via the RC-transmitter (the error buffer is erased).
- Via a standard customer RC-transmitter: key in "00"-sequence (the error buffer is **not** erased).

5.2.3 Customer Service Mode (CSM)

Purpose
When a customer is having problems with his TV-set, he can call his dealer or the Philips helpdesk (P3C). The service technician can than ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge the severity of the complaint. In many cases, he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer.
The CSM is a **read only** mode; therefore, modifications in this mode are not possible.

How to activate CSM
Use one of the following methods:
- Press the "MUTE" button on the RC-transmitter **simultaneously** with any key on the TV for at least 4 seconds.
- Key in the code "123654" via the standard RC transmitter.

Notes:
- Activation of the CSM is only possible if there is no (user) menu on the screen!
- During CSM, sound volume is set to 25% of the scale, "Smart Sound" is set to "Theatre" mode, and "Smart Picture" is set to "Rich/Movies" mode temporarily to ensure a good picture and sound of the working set. After leaving CSM, the original settings are restored.

How to navigate
By means of the "CURSOR-DOWN/UP" knob on the RC-transmitter, you can navigate through the menus.

Contents of CSM
The following information is displayed on screen:
- Text "CSM" on the first line.
- Line number for every line (to make CSM language independent).
- Option code information.
- Configuration information.
- Service-unfriendly modes.

1. **28PW8609/12** (if present). Type/model number according to the Philips standard.
2. **SOFTWARE.** Software version AAABBC-X.YY.
3. **HOURS ON.** Operating hours (in hexadecimal).
4. **CODES.** Shows the contents of the error buffer (the word "error" may not be used on this screen, instead "codes" is used).
5. **OP.** Option code information.
6. **SYSTEM.** "XXXXXX" is the (colour) system that is set for this preset (this is not applicable to NAFTA and AP-NTSC models).
7. **NO SIGNAL.** No "ident" signal present (VID status bit in MPIF) on selected source.
8. **TIMER ON** (if present). Timer (in "FEATURE" menu) is activated.
9. **CHANNEL LOCKED** (if present). Child Lock is activated (i.e. when local keyboard is locked).
10. **NOT PREFERED** (if present). Current channel is defined as skipped or non-preferred.

11. **HOTELMODE ON/OFF** (if present). Shows if the HOTEL mode is activated (only for Europe and AP).
12. **SOURCE.** Selected source before entry of CSM; XXX (channel no.), external source name (i.e. AV1, CVI, EXT1, etc...).
13. **SOUND.** Selected SOUND mode; "XX"= MONO, NICAM, STEREO, L1 (Language 1), L2 (Language 2), SAP, VIRTUAL, or DIGITAL prior entry to CSM.
14. **VOLUME.** Volume level before entry of CSM (typ. 00..100).
15. **BALANCE.** Balance level before entry of CSM (typ. -50..50).
16. **BRIGHTNESS.** Brightness level before entry of CSM (typ. 00..100).
17. **COLOR.** Colour level before entry of CSM (typ. 00..100).
18. **CONTRAST.** Contrast level before entry of CSM (typ. 00..100).
19. **HUE** (if present). Hue level before entry of CSM (typ. -50..100).

How to exit CSM

Use one of the following methods:

- After you press a key on the RC-transmitter (with exception of the "CHANNEL", "VOLUME" and digit (0-9) keys), or
- After you switch the TV-set "OFF" with the mains switch.
- After 15 min. no RC or local keyboard actions.

5.3 Problems and Solving Tips (related to CSM)

Note: Below described problems are all related to the TV settings. The procedures to change the value (or status) of the different settings are described above. New value(s) are automatically stored.

5.3.1 Picture Problems

Picture too dark

1. Press SMART PICTURE on the RC. In case the picture improves, increase the "Brightness" or the "Contrast" value. The new value(s) are automatically stored (in "personal" pre-set) for all TV channels.
2. Check in CSM lines BRIGHTNESS and/or CONTRAST. If the value of line BRIGHTNESS is low (< 10) or the value of line CONTRAST is low (< 10), increase them.

Picture too bright

1. Press SMART PICTURE on the RC. In case the picture improves, decrease the "Brightness" or the "Contrast" value. The new value(s) are automatically stored (in "personal" pre-set) for all TV channels.
2. Check in CSM lines BRIGHTNESS and/or CONTRAST. If the value of line BRIGHTNESS is high (> 40) or the value of line CONTRAST is high (> 50), decrease the "Brightness" or the "Contrast" value.

White line around picture elements and text

1. Press SMART PICTURE on the RC. In case the picture improves, decrease the "Sharpness" value. The new value is automatically stored (in "personal" pre-set) for all TV channels.
2. Check in CSM line SHARPNESS. Decrease the "Sharpness" value. The new value is automatically stored for all TV channels.

No picture

Check in CSM line 7. In case this line shows NO SIGNAL, check the aerial cable/aerial system.

Blue picture

No proper signal is received. Check the aerial cable/aerial system.

Blue picture and/or unstable picture

A scrambled or decoded signal is received.

Black and white picture

Check in CSM line COLOR. In case the value is low (< 10), increase the "Color" value. The new value is automatically stored for all TV channels.

No colours/colour lines around picture elements or colours not correct or unstable picture

1. Check in CSM line SYSTEM. If a "strange" system pops up, something has gone wrong during installation. Re-install the channel.
2. In case line SYSTEM is "FRANCE", the installed system for this pre-set is SECAM, while PAL is required. Install the required program again: open the installation menu and perform manual installation. Select system "West Europe".

Menu text not sharp enough

1. Press "SMART PICTURE". In case picture improves, decrease the "Contrast" value. The new value(s) are automatically stored for all TV channels.
2. Check in CSM line CONTRAST. If the value of this line is high (> 50), decrease the "Contrast" value.

5.3.2 Sound Problems

No sound from left and right speaker

Check in CSM line VOLUME. If the value is high, increase the value of "Volume". The new value(s) are automatically stored (in "personal" pre-set) for all TV channels.

Sound too loud for left and right speaker

Check in CSM line VOLUME. If the value is low, decrease the value of "Volume". The new value(s) are automatically stored (in "personal" pre-set) for all TV channels.

5.4 ComPair

5.4.1 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:

- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on I^2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I^2C commands yourself because ComPair takes care of this.
- ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

5.4.2 Specifications

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable.
For this chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector.

The ComPair faultfinding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:

- **Automatic** (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I2C busses of the TV-set.
- **Manually** (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extends. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions (e.g. Does the screen give a picture? Click on the correct answer: YES / NO) and showing you examples (e.g. Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the faultfinding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Beside fault finding, ComPair provides some **additional features** like:

- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the Dealer Service Tool (DST).
- If both ComPair and SearchMan (Electronic Service Manual) are installed, all the schematics and the PWBs of the set are available by clicking on the appropriate hyperlink.
  Example: *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Mono-carrier.*
  - Click on the "Panel" hyperlink to automatically show the PWB with a highlighted capacitor C2568.
  - Click on the "Schematic" hyperlink to automatically show the position of the highlighted capacitor.
- SW upgrading

5.4.3 Stepwise Start-up

This is realised via ComPair and is very helpful when a **protection** is activated (see also chapter "Protections"). Under normal circumstances, a fault in the power supply, or an error during start-up, will switch the television to protection mode. ComPair can take over the initialisation of the television. In this way, it is possible to distinguish which part of the start-up routine (hence which circuitry) is causing the problem. Take notice that the transition between two steps can take some time, so give the set some time to reach a stable state. During the transition time, the LED can blink strangely.

On activating Service mode, protections and other errors can be trapped by powering the TV in stepwise fashion as explained below. The "stepwise start-up" mode is done in the specified sequence. Before activating this mode, all the protections are disabled and are only enabled step-by-step, to trap the errors more appropriately.

The following steps are involved.

Step 0: Standby.

- Pre-condition: The set is in protection mode.
- Post-condition: The set is switched to the stepwise start-up mode. Only the necessary Standby Supply is present, all other supplies are switched "off".

Step 1: Power "on".

- Pre-condition: All protections are disabled, sound amplifiers are muted, and general initialisation is done.
- Post-condition: 8V and 5V supplies are "on". Degaussing is "on" and switched "off" after 3 s. The supply fault protections are enabled.

Step 2: Initialised.

- Pre-condition: Step 1 is done. No supply protection faults are detected.
- Post-condition: ADOC, MPIF, and Tuner components are initialised.

Step 3: Deflection "on".

- Pre-condition: Step 2 is done. No protection faults detected.
- Post-condition: Deflection is switched "on". The horizontal deflection fault protections are enabled.

Step 4: TV "on".

- Pre-condition: Step 3 is done. No protection faults detected.
- Post-condition: Picture tube is switched "on". Sound amplifiers are demuted. The X-ray/beam current fault protections are enabled.

Note: When the set is in stepwise mode and, due to stepping-up, a protection is activated, the set will really go into protection (blinking LED). The set will not leave the stepwise-mode however. If state X is the state where the set went to protection, stepwise start-up will return to state X-1. At state (X-1) diagnostic measurements can be performed. Also, in the short time, the set is in state X but not in protection, you can also do some measurements.

5.4.4 How To Connect

1. First, install the ComPair Browser software (see the Quick Reference Card for installation instructions).
2. Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked with "PC") of the ComPair interface.
3. Connect the mains adapter to the supply connector (marked with "POWER 9V DC") of the ComPair interface.
4. Switch the ComPair interface "OFF".
5. Switch the television set "OFF" with the mains switch.
6. Connect the ComPair interface cable between the connector on the rear side of the ComPair interface (marked with "I2C") and the ComPair connector at the rear side of the TV.
7. Plug the mains adapter in a mains outlet, and switch the interface "ON". The green and red LEDs light up together. The red LED extinguishes after approx. 1 second while the green LED remains lit.
8. Start the ComPair program and read the "Introduction" chapter.

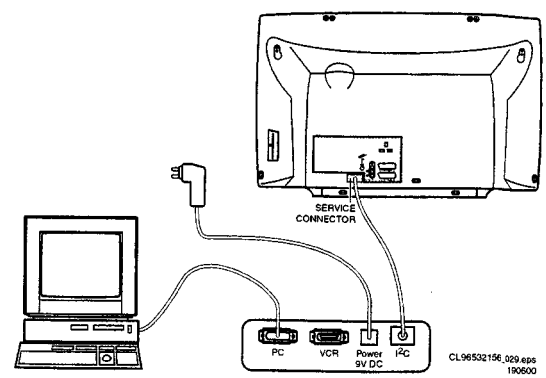


Figure 5-1 ComPair Interface connection

5.4.5 How To Order

ComPair order codes:

- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (excluding transformer): 4822 727 21631.
- Starter kit ComPair32 software (registration version): 3122 785 60040.
- Starter kit SearchMan32 software: 3122 785 60050.
- ComPair32 CD (2003 update): 3122 785 60110.
- SearchMan32 CD (2003 update): 3122 785 60120.
- ComPair interface cable: 3122 785 90004.
- ComPair firmware upgrade IC: 3122 785 90510.
- Transformer Europe: 4822 727 21632.
- Transformer UK: 4822 727 21633.

5.5 Error Codes

5.5.1 Introduction

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right, new errors are logged at the left side, and all other errors shift one position to the right.
When an error has occurred, the error is added to the list of errors, provided the list is not full or the error is a protection error.
When an error occurs and the error buffer is full, then the new error is not added, and the error buffer stays intact (history is maintained), except when the error is a protection error.
To prevent that an occasional error stays in the list forever, the error is removed from the list after 50+ operation hours.
When multiple errors occur (errors occurred within a short time span), there is a high probability that there is some relation between them.

5.5.2 How to read the Error Buffer

Use one of the following methods:
- On screen via the SAM (only if you have a picture). Examples:
  - **0 0 0 0**: No errors detected
  - **6 0 0 0**: Error code 6 is the last and only detected error
  - **9 6 0 0**: Error code 6 was first detected and error code 9 is the last detected error
- Via the blinking LED procedure (when you have no picture). See next paragraph.
- Via ComPair.

5.5.3 How to clear the Error Buffer

Use **one** of the following methods:
- By activation of the "CLEAR ERRORS" command in the SAM menu.
- With a normal RC, key in sequence "MUTE" followed by "062599" and "OK".
- When you transmit the commands "DIAGNOSE" - "99" - "OK" with ComPair (or with a DST).
- If the content of the error buffer has not changed for 50+ hours, it resets automatically.

5.5.4 Error Codes

Error codes are required to indicate failures in the TV set. In principle a unique error is available for every:
- I2C device error.
- I2C bus error (for every bus containing two or more I2C devices).
- Protection error (e.g. +8V protection or Horizontal protection).
- Error not related to an I2C device, but of importance (e.g. BC-loop, RAM error).

Table 5-1 Error Table

Error	Description
0	No error
1	Horizontal Protection (via NOHFB bit in ADOC)
3	+8V error (missing/protection active by checking MPIF ASUP bit))
4	X-ray/High beam current protection signal (via XPROT bit in ADOC)
5	Hardware Protection is active (same as EMG)
7	Under-voltage protection
11	MPIF I2C communication failure / MPIF test failed
12	BC-loop not stabilised within the time limit (i.e. after timer is expired)
13	NVM I2C communication failure
14	Main tuner I2C failure UV13xx
17	3D Combfilter I2C communication failure
18	PIP Tuner I2C failure
19	2fH component input I2C failure (PCF8574)
21	PIP IF demodulator IC TDA988x communication failed (only for PIP/DW sets)
22	Flash over protection error (to register CRT flash-overs, via FPR bit in ADOC)

Service tips:
- In case of non-intermittent faults, clear the error buffer before you begin the repair. This to ensure that old error codes are no longer present. Before clearing the buffer, write down the content, as this history can give you significant information.
- If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection).

5.6 The Blinking LED Procedure

5.6.1 Introduction

Via this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful for fault finding, when there is no picture.

When the SDM is activated, the front LED will show (blink) the contents of the error-buffer. Error-codes > 10 are shown as follows:
1. A long blink of 750 ms (which is an indication of the decimal digit),
2. A pause of 1500 ms,
3. "n" short blinks (where "n" = 1 - 9),
4. When all the error-codes are displayed, the sequence finishes with a LED blink of 3000 ms,
5. The sequence starts again.

Example: Error 12 9 6 0 0.
After activation of the SDM, the front LED will show:
1. 1 long blink of 750 ms (which is an indication of the decimal digit) followed by a pause of 1500 ms,
2. 2 short blinks of 250 ms, followed by a pause of 3000 ms,
3. 9 short blinks of 250 ms, followed by a pause of 3000 ms,
4. 6 short blinks of 250 ms, followed by a pause of 3000 ms,
5. 1 long blink of 3000 ms to finish the sequence,
6. The sequence starts again.

5.6.2 How to activate

Use one of the following methods:
- Activate the SDM (only via soldering pads marked "FOR SERVICE" on the SSB). The blinking front LED will show the entire contents of the error buffer (this works in "normal

operation" mode and in "protection" mode). In order to avoid confusion with RC5 signal reception blinking, this LED blinking procedure is terminated when an RC5 command is received.
- Transmit the commands "MUTE", "06250x", and "OK" with a normal RC (where "x" is the position in the error buffer that has to be displayed). With x= 1, the last detected error is shown, x= 2 the second last error, etc.... When x= 0, all errors are shown.
- "DIAGNOSE X" with the DST (where "x" is the position in the error buffer that has to be displayed). With x= 1, the last detected error is shown, x= 2 the second last error, etc.... When x= 0, all errors are shown.

Note: It can take some seconds before the blinking LED starts.

5.7 Protections

5.7.1 Introduction

Fault protections are introduced to avoid unacceptable temperature rising and burning hazards. If a fault situation is detected, an error code will be generated and if necessary, the set is put in protection mode.
The protection mode is indicated by the blinking of the front LED at a frequency of 3 Hz (or by a coded blinking in special cases). For the customer, it is made impossible to switch "on" the set during a protection.
It is possible to determine the type of fault by interpreting the blinking pattern of the LED indicator. It is also possible to read out the error codes from the NVM via ComPair. It is possible to de-activate the protection states in the Service Default Mode.

The following protections are implemented:

Table 5-2 Protections overview

Protection	Detection method	Bit name	Detection
Under Voltage	Via ADC (KB)	ADC (KB)	ADC input
+8V Supply	Via MPIF_IRQ	ASUP	MPIF internal register
Horizontal fly-back	Via interrupts	NOHFB	ADOC internal register (DOP)
X-ray	Via interrupts	XPROT	ADOC internal register (DOP)
Beam Current	Via interrupts	BCF	ADOC internal register (DOP)
Flash	Hardware ctrl	-	Hardware
Arc	Hardware ctrl	-	Hardware
Vertical	Hardware ctrl	-	Hardware
East/West	Hardware ctrl	-	Hardware
Bridge coil	Hardware ctrl	-	Hardware

The protections are split up in the following order:
- I2C related protections.
- ADOC related protections (via polling on I/O pins or via algorithms).
- DOP related protections (mainly for deflection items).
- Hardware errors that are not sensed by the OTC (e.g. vertical flyback protection, bridge coil protection, E/W protection, arcing protection).

All faults detected are re-checked five times before the protection mode is triggered. It should be noted that supply fault detection/protection are enabled only after the chassis power supply has been established. Likewise, after the line drive starts, the deflection detection/protection must be enabled. To prevent false activation of protection mode during power mode transitions, interrupts related to supply fault and deflection fault are disabled.

5.7.2 I2C Related Protections

In normal operation, some registers of the I2C controlled ICs are refreshed every 200 ms. During this sequence, the I2C busses and the I2C ICs are checked.
An I2C protection will take place if the SDA and SCL lines are short-circuited to ground, or to each other. An I2C error will also occur, if the power supply of the IC is missing.

5.7.3 ADOC Related Protections

If a protection is detected at an ADOC input, the uP will start to scan all protection inputs every 200 ms for five times. If the protection on one of the inputs is still active after 1 s, the microprocessor will put the set in the protection mode. Before the scanning is started, a so-called "ESD refresh" is carried out. This is done, because the interrupt on one of the inputs is possibly caused either by a flash or by ESD. As a flash or ESD can influence IC settings, the key ICs are initialised again, to ensure the normal picture and sound conditions of the set.

Under Voltage Protection
The under voltage protection is needed due to the non-isolated chassis architecture used in A02. Whenever there is a short circuit in the Deflection yoke coil or in the Audio power supply, the averaged Horizontal Flyback Voltage (HFB_XRAY_PROT) will fall. After signal conditioning, this voltage is fed to the "KEYBOARD_ADC" input. When this input of the MIPS controller is less than a certain level, the under voltage protection is activated. This is done by the normal keyboard polling mechanism.
The protection mode is activated after five consecutive occurrences. Response time required is 2 s. This is to avoid set going to under voltage protection mode during start up, since the HFB will only be stable w.r.t. mains on for about 1.6 s.

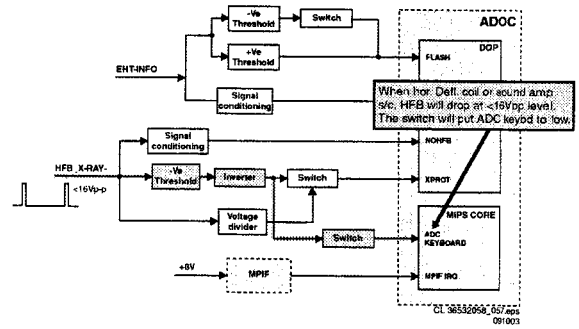


Figure 5-2 Under Voltage Protection

+8V Protection
Hardware is employed for the detection of +8V supply fault. A hardware interrupt (MPIF-IRQ) is generated by the MPIF when the +8V supply falls below the IC specification.
To avoid false detection, the corresponding interrupt sub routine checks the status of "ASUP" bit in the MPIF status register for five times consecutively with an interval of 200 ms before triggering the protection mode. Response time required is 1.2 s.

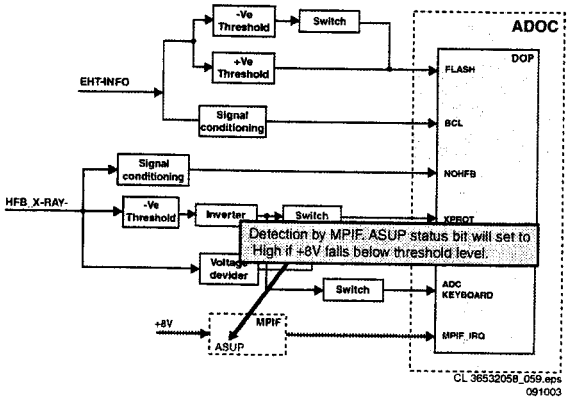


Figure 5-3 +8V Protection

5.7.4 DOP Related Protections

The uP reads every 200 ms the status register of the DOP (via the I2C bus). If a protection signal is detected on one of the inputs of the DOP, the relevant error bit in the register is set to "high". If this error bit is still "high" after 1 s, the OTC will store the error code in the error buffer of the NVM and, depending on the relevancy of the error bit, the set will either go into the protection mode or not.

Horizontal Fly Back Protection

Hardware is employed for the detection of a horizontal deflection fault. The DOP core generates a hardware interrupt when consecutive three horizontal flyback pulses are not received at the HFB input of the DOP block of the ADOC IC. To avoid false detection, the corresponding interrupt sub routine checks the status of "NOHFB" status bit in the DOP core for five times consecutively with an interval of 50 ms before triggering the protection mode. The response time for this protection needed is 300 ms.

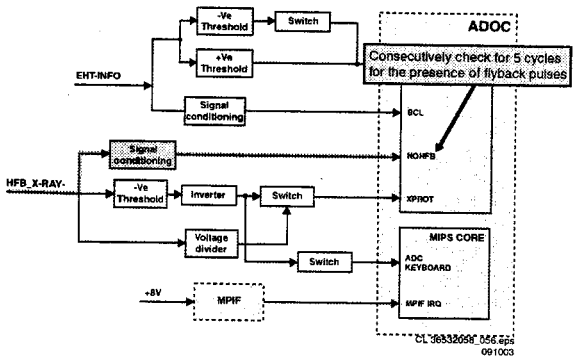


Figure 5-4 Horizontal Fly Back Protection

X-Ray Protection (Over Voltage, USA only)

Hardware is employed for the detection of X-ray fault. A hardware interrupt is generated by the DOP core when the "XPROT" input of ADOC IC is pulled "HIGH" (flyback pulses are > 27 V_pp).

To avoid false detection, the corresponding interrupt sub routine checks the status of "XPROT" bit in DOP core for five times consecutively with an interval of 50 ms before triggering the protection mode. It should be noted that the "XPROT" status is not reset on reading. It should be cleared by the software explicitly.

Once the XRAY protection status is confirmed, the "PRD" bit has to be set to "1" by software. This enables an automatic stop of the H-out via Slow Stop initiated by auto-clearing the DFL bit. Now, the protection mode is activated.

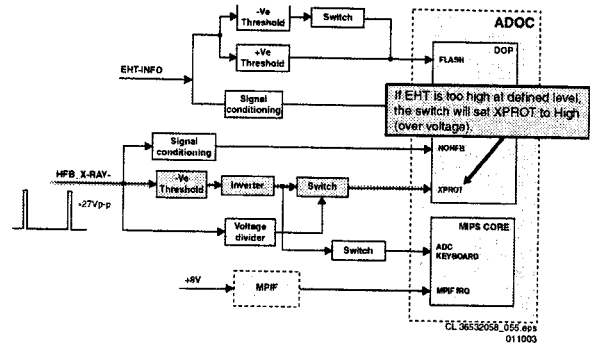


Figure 5-5 X-Ray Protection

Beam Current Protection

A hardware interrupt is generated by the DOP core when the current at the BCL input of the ADOC IC exceeds the limit. To avoid false detection, the corresponding interrupt sub routine checks the status of "BCF" bit in DOP core for five times consecutively with an interval of 50 ms before triggering the protection mode. Once the BCL protection status is confirmed, the "PRD" bit has to be set to "1" by software. This enables an automatic stop of the H-out via Slow Stop initiated by auto-clearing the "DFL" bit. Now, the protection mode is activated.

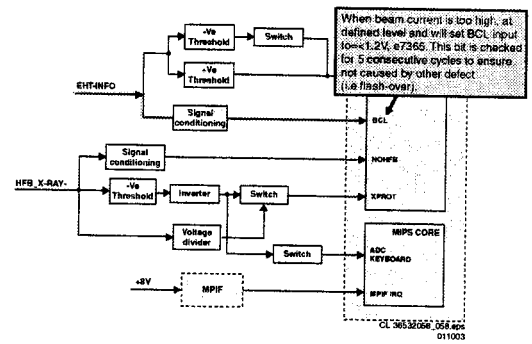


Figure 5-6 Beam Current Protection

Flash Protection

Flash detection is used to shutdown the set only if the Flash occurs more than 5 times and is persistent. Therefore, this is a method to protect the set from undue electrical stress because of picture tube flashes. The flash detector circuitry uses the "EHT_INFO" signal as input. Its output is connected to the "FLASH" input of the DOP block of the ADOC.

When the "FLASH" input is pulled "HIGH", the ADOC's horizontal drive output stops immediately and the "FPR" status bit of the DOP core is set to "1". The status is latched until readout. With the absence of any other disturbances, the horizontal drive output will restart after the "FLASH" input is "LOW" again. No software interaction is required in this case. The "FPR" bit has to be readout by polling at an interval of 500 ms. If the "FPR" status bit has been set to "1" for more than 5 times consecutively, then the protection mode has to be triggered. Setting the "FPR" bit for less than 5 times by the "FLASH" input does not need to trigger the protection mode (shutting down of the H-drive should be enough).

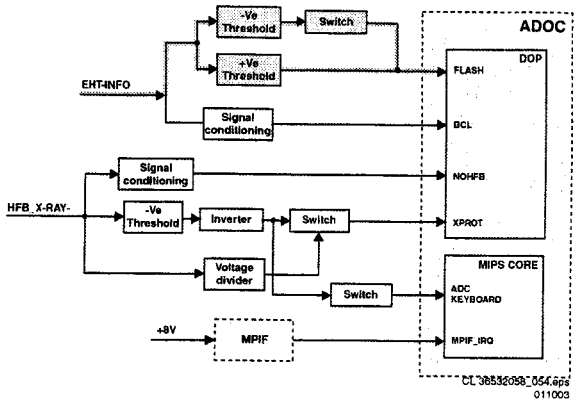


Figure 5-7 Flash Protection

5.7.5 Hardware Related Protections

Due to the architecture (read "hot" deflection), some protections cannot be sensed by the microprocessor. These protections will lead to a protection on set level (Standby mode and blinking LED).

Arc Protection
If there are "open" connections (e.g. bad solder joints) in the high-energy deflection circuitry, this can lead to damaging effects (read: fire). For that reason, the E/W current is sensed (via 3479//3480). If this current becomes too high, the "thyristor" circuit (TS7653 and TS7654) is triggered. TS7442 is switched "on" and TS7443 is forced into conduction. The "SUP-ENABLE" signal is shorted now to ground level, which will force the Main Power Supply to Standby mode. This prevents further arcing.

Vertical Protection
If the frame stage generates no pulses, TS7641 will block. TS7443 is now switched "on", which will lead to Standby mode. Therefore, in normal operation condition, TS7641 and TS7652 are conducting, while TS7443 is blocked.

EW protection
Several faults in the defection circuit can cause excessive currents through MOSFET 7480. The temperature of this device can become too high, causing an unsafe situation. The power supply is shut down in the above-mentioned way.
Caution: All hardware deflection protections can be disabled by interrupting R3403 on the LSP.
However, be careful: unsafe situations (heat) can occur or the picture tube can be destroyed.

Bridge coil protection
According safety regulations, every coil may be short-circuited. By doing this in the secondary winding of coil L5422, high currents will flow in the winding. With no safety circuit, the coil will begin to burn soon.
This is sensed via the "EW" signal going to the base of TS7652 (via R3495 and D6499). In a normal situation, the voltage on C2498 (diagram A4) is high and TS7652 is conducting. When bridge coil 5422 (diagram A3) is short circuited, the voltage on C2498 changes to low, which will block TS7652. In this case, also TS7641 will block and the voltage on 2642 will rise until TS7443 is forced in conduction. The "SUP-ENABLE" signal (in normal operating condition -20 V) is shorted now to ground level, which will force the Main Power Supply to Standby mode.
Note: Maximum EW width settings can also cause a protection.

5.8 Repair tips

5.8.1 Miscellaneous

The relay you hear when you switch the set "on" (from Standby or via the mains switch), is from the degaussing circuitry. It is **not** used for switching the Power Supply (as done in the MG-chassis).

- Take care not to touch the "hot" heatsink while disconnecting the SSP, despite the fact that the mains cord is out of the mains socket. There still can be an annoying rest-voltage on the heatsink for a short while, because the discharge resistors 3502 and 3503 (on the LSP between hot and cold part) are not stuffed for Europe. Instead, discharge resistors 3066 and 3057 on the Mains Switch panel are used, but because they are located **before** the Mains switch, they only discharge when this switch is "on". **Advice:** when you want to disconnect the SSP, first disconnect the Mains cord, but keep the Mains Switch in the "on" position.
- Where the circuitry was too "crowded" for service printing, you can find the correct location on the "test point overviews" in this manual.
- **A very large part of the LSP is "hot",** such as:
  - The primary part of the Standby Supply.
  - The whole Main supply (except for the secondary Audio supply).
  - And the complete deflection circuitry (so notice that the deflection coil is hot!).

5.8.2 Start-up/Shut-down Sequence

For a detailed description, see chapter 9 " Circuit Descriptions, Abbreviation List, and IC Data Sheets".

5.8.3 ComPair

This chassis does not have an IR transmitting LED (as in MG-sets). Therefore, a "Service" (ComPair) connector is implemented at the rear side of the set, which is directly accessible. In addition to this, there is also a blinking LED procedure to show the contents of the error buffer.

When you use ComPair, you have the possibility to activate a "stepwise start-up" mode. With this mode, you can initiate the start-up sequence step by step. This also means that in certain steps, some protections are not activated. This is sometimes very convenient during repair.

5.8.4 Protections

Activating SDM via the "service pads" will overrule the processor-controlled protections, but **not** the hardware protections.
Caution: When doing this, the service technician must know what he is doing, as it could lead to damaging the set.

The "ARC"- and/or "BRIDGECOIL" protection are hardly ever triggered, however:

- When you suspect the "ARC" protection, look for bad solder joints and smell. By interrupting resistor 3497, this protection is disabled (special attention needed!).
- When you suspect the "BRIDGECOIL" protection, which can also be due to a too wide picture amplitude, shorten G and S of the E/W MOSFET 7480. This will disable the protection. You will now have minimal horizontal amplitude. Re-align the horizontal amplitude in the SAM menu and remove the G/S short of TS7480.

5.8.5 Main Supply

1. Replace FET 7504 and zener 6505.
2. Disconnect the SSP panel.
3. Short B and E of TS7529, in order to put the Main Supply in "on"-mode (TS7529 is blocking then).
   Caution: To prevent that R3403 and TS7443 will be damaged, **first disable the HW-protection of the deflection circuit.** Therefore, short-circuit C2642 on the LSP (diagram A4).
4. Attach a load of 500 Ω to the V_BAT capacitor C2515 (the supply can not work without a minimum load).
5. Use a variac, and slowly increase the V_MAINS. Measure over sensing resistors R3514//15, if a nice sawtooth voltage becomes available.
6. Also, measure the V_BAT. This may never exceed +141 V. If it does, there is something wrong in the feedback circuitry (e.g. regulator 7506).

Note: Be careful when measuring on the gate of FET TS7504. This circuitry is very high ohmic and can easily be damaged (first connect ground to measuring equipment, than measure the gate).

5.8.6 Frame Deflection

Caution: When the Frame Deflection circuitry is suspected, one must be careful. Because there is a DC-voltage on the frame deflection, **the beam current could damage the CRT neck, leading to a defective CRT.**

To prevent this from happening, you must:
1. Interrupt the resistors 3403 and 3404 on the CRT panel (diagram F), in order to remove the "filament" voltage from the tube (no beam current, so no chance of destroying the CRT).
2. Interrupt resistor 3403 on the LSP (diagram A4) to disable the "SUP-ENABLE" line.
3. Measure with a multi-meter, or better with an oscilloscope, the functionality of the Frame stage.
4. After you have found the cause, exchange the defective component (e.g. TDA8177), and re-solder the interrupted resistors.

Table 5-3 Repair tips

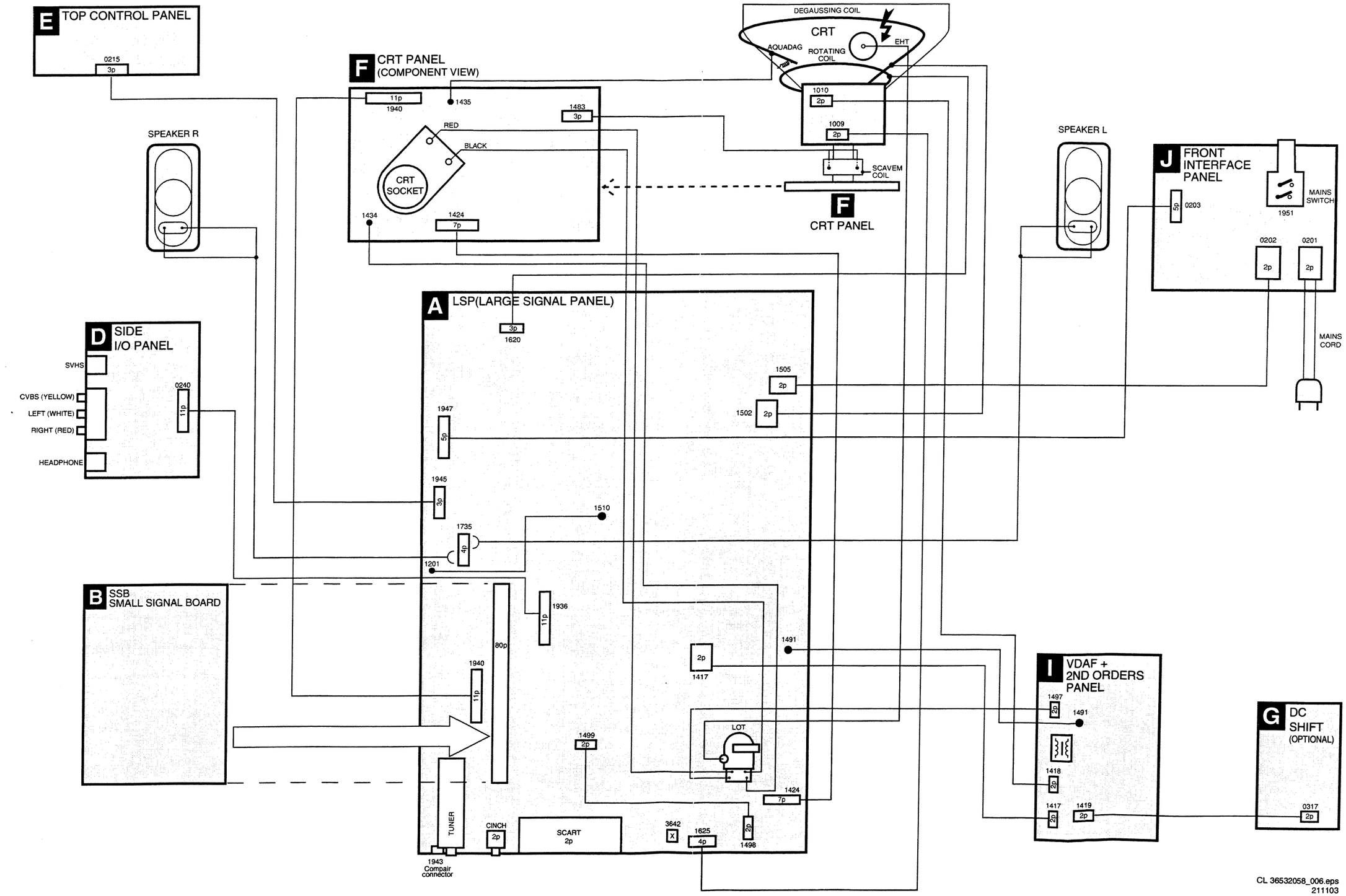
Phenomenon	Possible Cause	Repair tip
No picture, no LED.	Standby Supply defective.	Measure circuitry (see diagram A2). Start at test-point A19.When the Mains switch is "on", this voltage must always be available.
No picture, LED blinking at 3 Hz.	Set is in protection due to various causes. For error codes see error-code list.	You have no picture, so: read the error buffer via ComPair (error buffer is accessible when set is in protection, ComPair-file will guide you to this). Read the blinking LED information via standard remote command mute-06250x-ok. Or you read the error code sequence via standard remote command mute-062500-ok. When you have found the error, check the circuitry related to the supply voltage and I2C-communication or the circuitry that triggers the protection.
No picture, LED blinking with code 8-8-8-etc or 9-9-9-etc.	No communication on slow I2C- or fast I2C-bus.	As processor cannot communicate with one of the 2 busses it the standby-LED spontaneously starts blinking 8-8-8-etc or 9-9-9-etc... If in the error buffer somewhere is an error 8 or 9, these will have the highest priority starting the mentioned blinking. Measure dependent of the error on the I2C-bus which device is loading the bus (use the I2C-overview)
No picture, LED blinking with code 13-13-13-etc.	No communication on NVM-I2C bus to the uP.	As the uP cannot communicate with the NVM I2C bus, it spontaneously starts blinking 13-13-13-etc. Note: when there is no access to the NVM, a lot of picture setting can go wrong.
No picture, no sound. Set is making audible squeaking sound	Supply is possibly in hiccup-mode, which is audible via a squeaking supply transformer.	Possible causes: V_BAT is shorted (caused by short circuited line transistor 7421), the sound winding is shorted (amplifier is shorting the power supply lines), or D6514 is shorted (due to a too high V_BAT). Remove excessive load, to see what causes the failure, or check feedback circuit. See repair tip "Main Power Supply" (supply needs a minimal load).
No picture, no sound. Front LED works fine	Supply does not work correctly.	If e.g. V_BAT is only about 90 V, it is possible that the regulator IC (7506) is defective.
No RC-reception. Front LED does not echo RC-commands.	uP circuitry or RC-receiver is defective.	In case the set does react on a local keyboard operation, you must check the RC-receiver circuitry (diagram J).
Relay (degaussing) is not audible; when set is switched from "off" or "standby" to "on".	uP is not working correctly. When line "DEGAUS" is low, the degaussing must be activated.	Check RESET-circuitry (IC7581 on diagram B11). Check the level on line "DEGAUS" when you switch the set "on". Signal must be low initially and go to high after approx. 12 s.
Picture is rotated.	Rotation circuitry (if present) on diagram A5, or related supply to it, malfunctions.	Measure test points on diagram A5.
Picture is continuously switching "off" and "on", showing heavy "switch" spots (set does not go into protection).	200 V is missing on CRT panel.	Probably a bad connection from LSP connector 1424 to CRT connector 1424 (diagram F), or an interruption of the 200 V supplies line (e.g. R3341 on circuit F1 is interrupted).
Picture is not sharp.	Focus is possibly mis-aligned or SCAVEM-circuitry does not work correctly.	Re-align the "FOCUS" potmeter on the Line Output Transformer, or check the SCAVEM circuitry on the CRT-panel (diagram F). It is also possible that the DAF circuitry is defective (see diagram I). Check the V_dc values.
Picture is distorted.	Check video-path in Service Default Mode.	Investigate whether there is an error code present in the error buffer. In case there is one, check the I2C-bus and/or supply lines (see overview supply lines). Measure and check signal path Tuner-MPIF-ADOC-RGB amplifier. In case it is a geometry issue, check on diagram A4 opto-coupler 7482, OpAmps 7440/7450 and the Frame circuitry alignments or a possible corrupted NVM (IC7525 on diagram B11).
No menu, no OSD.	Probably a defective uP (ADOC).	
No Teletext.	IC7730 defective or not powered.	Check circuitry around IC7730 on diagram B13.
Strange switch "off" behaviour	TS7445 possibly defective.	Check, with a multi-meter, whether transistor TS7445 is well functioning. (diagram A3).
Various symptoms, due to missing local supply voltage.	An interrupted fuse, NFR-resistor or connection.	When no symptom or error code leads you to a specific circuitry, use the supply lines overview (see supply lines overview), for a quick scan of all supply lines.

5.9 Software Downloading

In this chassis, you can **upgrade** the software via ComPair. You can find more information on how this procedure works in the ComPair file. It is possible that not all sets are equipped with the hardware, needed to make software upgrading possible. To speed up the programming process the firmware of the ComPair interface can be upgraded. See paragraph "How To Order" for the order numbers.

6. Block Diagrams, Testpoint Overview, and Waveforms

Wiring Diagram



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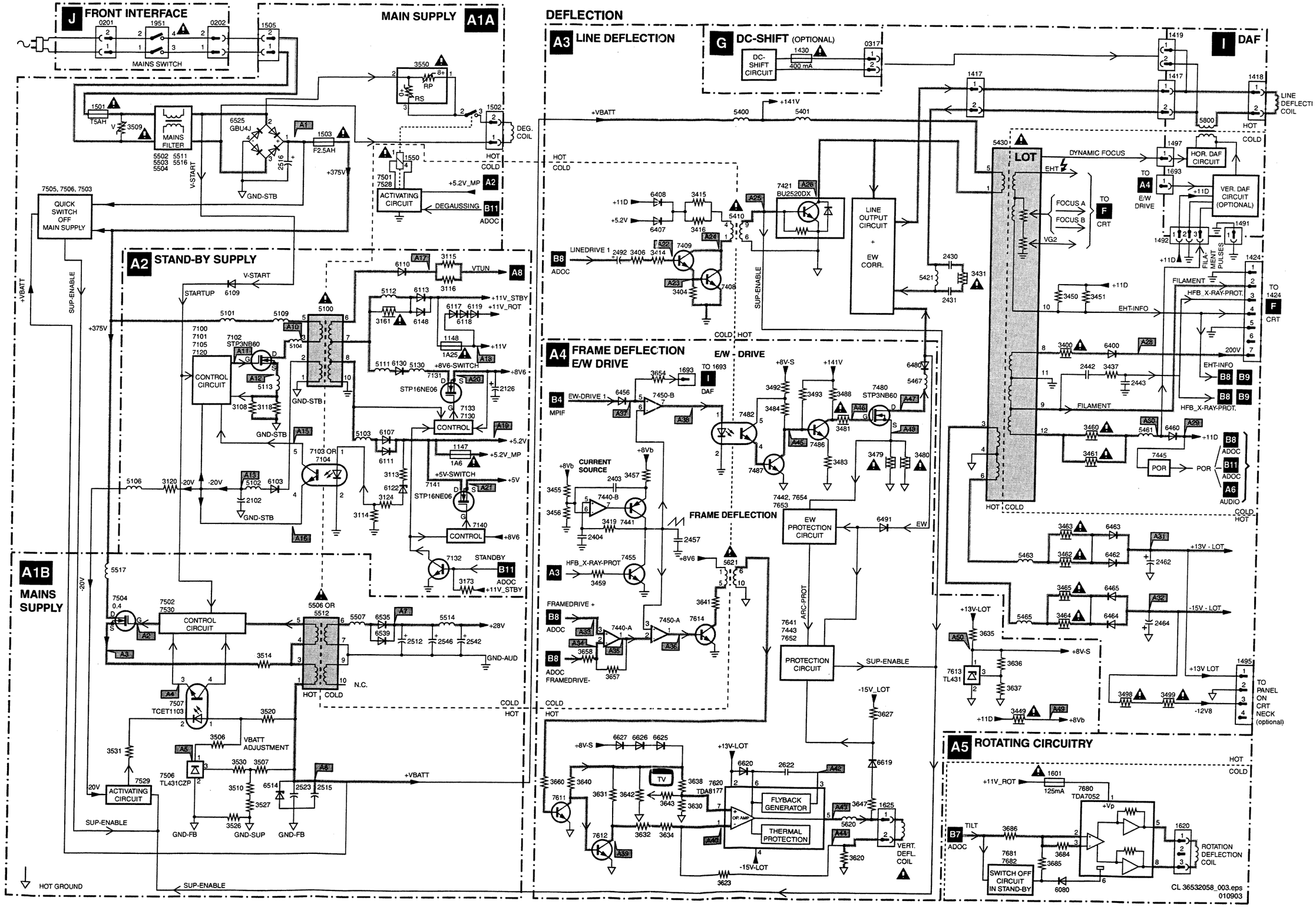
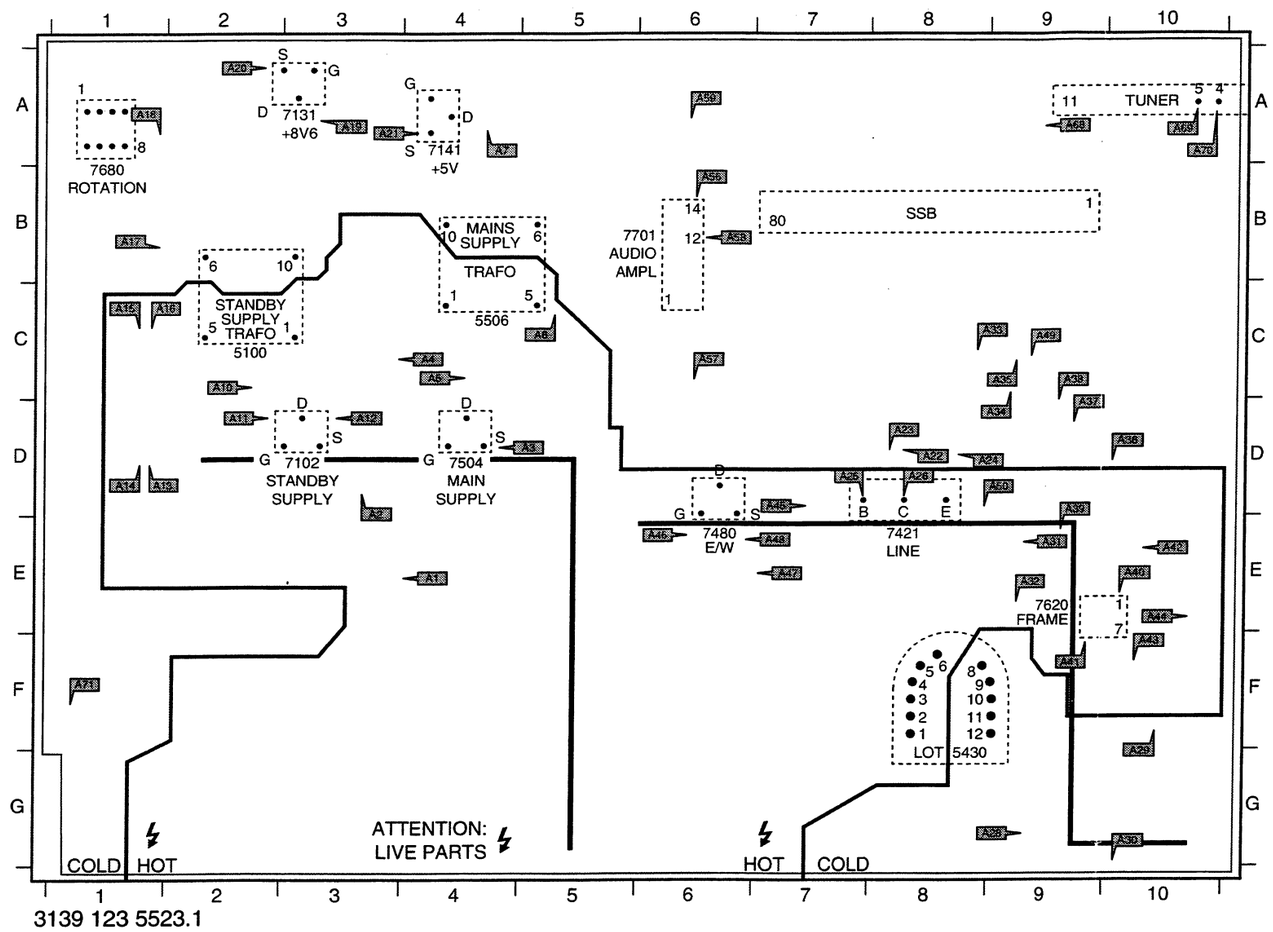
Block Diagram LSP Supply and Deflection



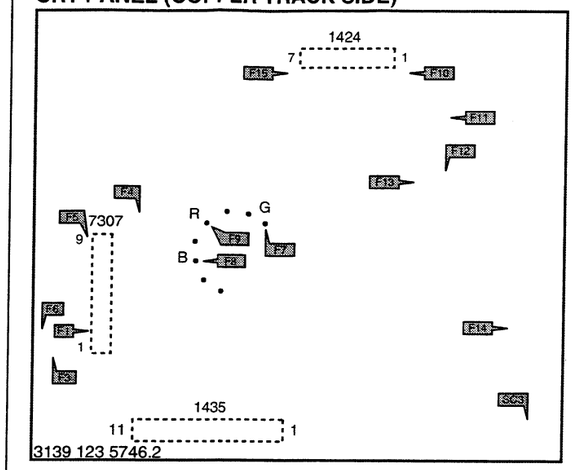
Testpoint Overview LSP and CRT

LSP COPPER TRACK SIDE

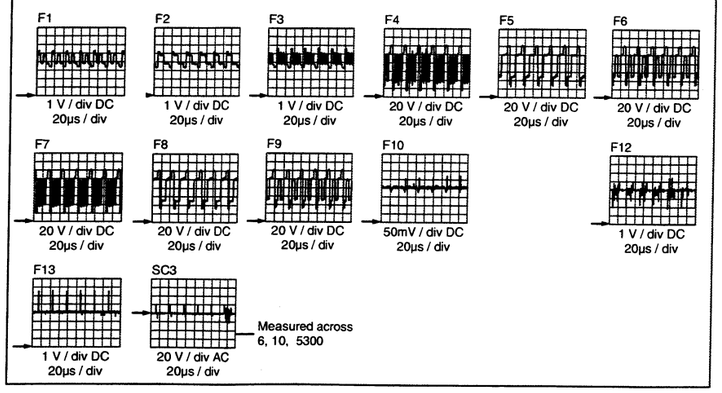


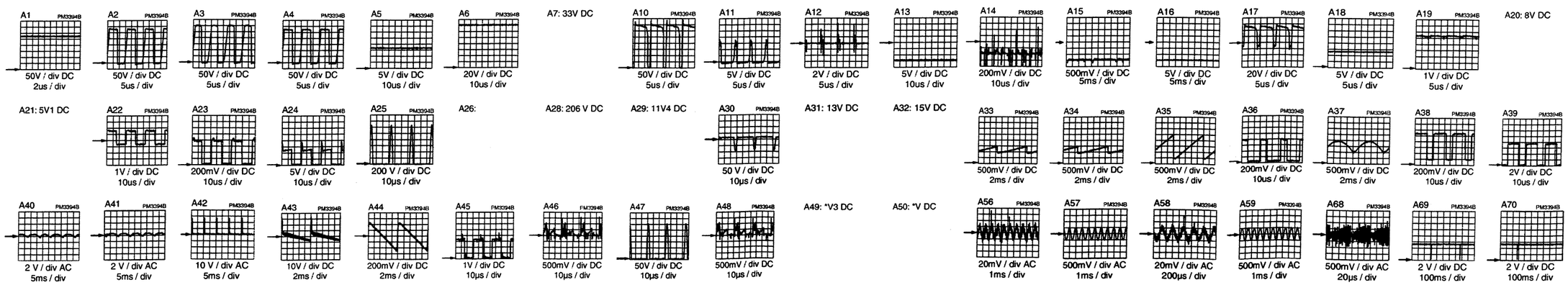
A1	E4	A58	C6
A2	D3	A59	B5
A3	D4	A68	A9
A4	C4	A69	A10
A5	C4	A70	A10
A6	C5		
A7	A4		
A10	C2		
A11	C2		
A12	D3		
A13	D1		
A14	D1		
A15	C1		
A16	C1		
A17	B1		
A18	A1		
A19	A3		
A20	A2		
A21	A3		
A22	D8		
A23	D8		
A24	D8		
A25	D8		
A26	D7		
A28	G9		
A29	G10		
A30	G10		
A31	E9		
A32	E9		
A33	C8		
A34	D9		
A35	C9		
A36	D10		
A37	D9		
A38	C9		
A39	D10		
A40	E10		
A41	E10		
A42	E10		
A43	F10		
A44	E10		
A45	D7		
A46	E6		
A47	E7		
A48	E7		
A49	C9		
A50	D9		
A56	C6		
A57	B6		

CRT PANEL (COPPER TRACK SIDE)



F1	E4		
F2	D3		
F3	D4		
F4	C4		
F5	C4		
F6	C5		
F7	A4		
F10	C2		
F11	C2		
F12	D3		
F13	D1		
14	D1		
A15	C1		
A16	C1		
A17	B1		
A18	A1		
A19	A3		
A20	A2		
A21	A3		
A22	D8		
A23	D8		
A24	D8		


F1 1 V / div DC 20µs / div
F2 1 V / div DC 20µs / div
F3 1 V / div DC 20µs / div
F4 20 V / div DC 20µs / div
F5 20 V / div DC 20µs / div
F6 20 V / div DC 20µs / div
F7 20 V / div DC 20µs / div
F8 20 V / div DC 20µs / div
F9 20 V / div DC 20µs / div
F10 50mV / div DC 20µs / div
F12 1 V / div DC 20µs / div
F13 1 V / div DC 20µs / div
SC3 20 V / div AC 20µs / div
Measured across 6, 10, 5300


A1 PM3394B 50V / div DC 2us / div
A2 PM3394B 50V / div DC 5us / div
A3 PM3394B 50V / div DC 5us / div
A4 PM3394B 50V / div DC 5us / div
A5 PM3394B 5V / div DC 10us / div
A6 PM3394B 20V / div DC 10us / div
A7: 33V DC
A10 PM3394B 50V / div DC 5us / div
A11 PM3394B 5V / div DC 5us / div
A12 PM3394B 2V / div DC 5us / div
A13 PM3394B 5V / div DC 10us / div
A14 PM3394B 200mV / div DC 10us / div
A15 PM3394B 500mV / div DC 5ms / div
A16 PM3394B 5V / div DC 5ms / div
A17 PM3394B 20V / div DC 5us / div
A18 PM3394B 5V / div DC 5us / div
A19 PM3394B 1V / div DC 5us / div
A20: 8V DC
A21: 5V1 DC
A22 PM3394B 1V / div DC 10us / div
A23 PM3394B 200mV / div DC 10us / div
A24 PM3394B 5V / div DC 10us / div
A25 PM3394B 200 V / div DC 10µs / div
A26:
A28: 206 V DC
A29: 11V4 DC
A30 PM3394B 50 V / div DC 10µs / div
A31: 13V DC
A32: 15V DC
A33 PM3394B 500mV / div DC 2ms / div
A34 PM3394B 500mV / div DC 2ms / div
A35 PM3394B 500mV / div DC 2ms / div
A36 PM3394B 200mV / div DC 10us / div
A37 PM3394B 500mV / div DC 2ms / div
A38 PM3394B 200mV / div DC 10us / div
A39 PM3394B 2V / div DC 10us / div
A40 PM3394B 2 V / div AC 5ms / div
A41 PM3394B 2 V / div AC 5ms / div
A42 PM3394B 10 V / div AC 5ms / div
A43 PM3394B 10V / div DC 2ms / div
A44 PM3394B 200mV / div DC 2ms / div
A45 PM3394B 1V / div DC 10µs / div
A46 PM3394B 500mV / div DC 10µs / div
A47 PM3394B 50V / div DC 10µs / div
A48 PM3394B 500mV / div DC 10µs / div
A49: *V3 DC
A50: *V DC
A56 PM3394B 20mV / div AC 1ms / div
A57 PM3394B 500mV / div AC 1ms / div
A58 PM3394B 20mV / div AC 200µs / div
A59 PM3394B 500mV / div AC 1ms / div
A68 PM3394B 500mV / div AC 20µs / div
A69 PM3394B 2 V / div DC 100ms / div
A70 PM3394B 2 V / div DC 100ms / div

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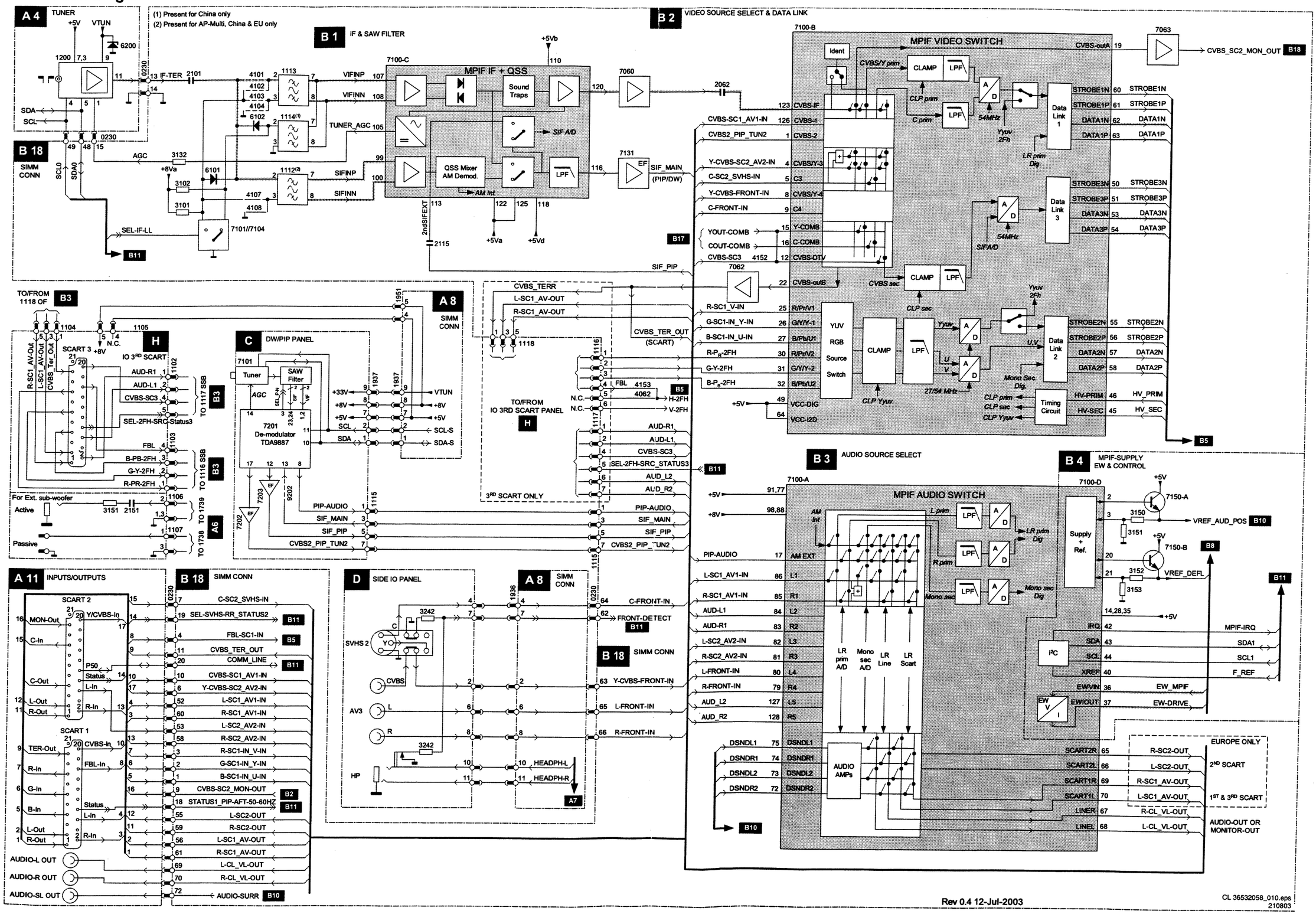
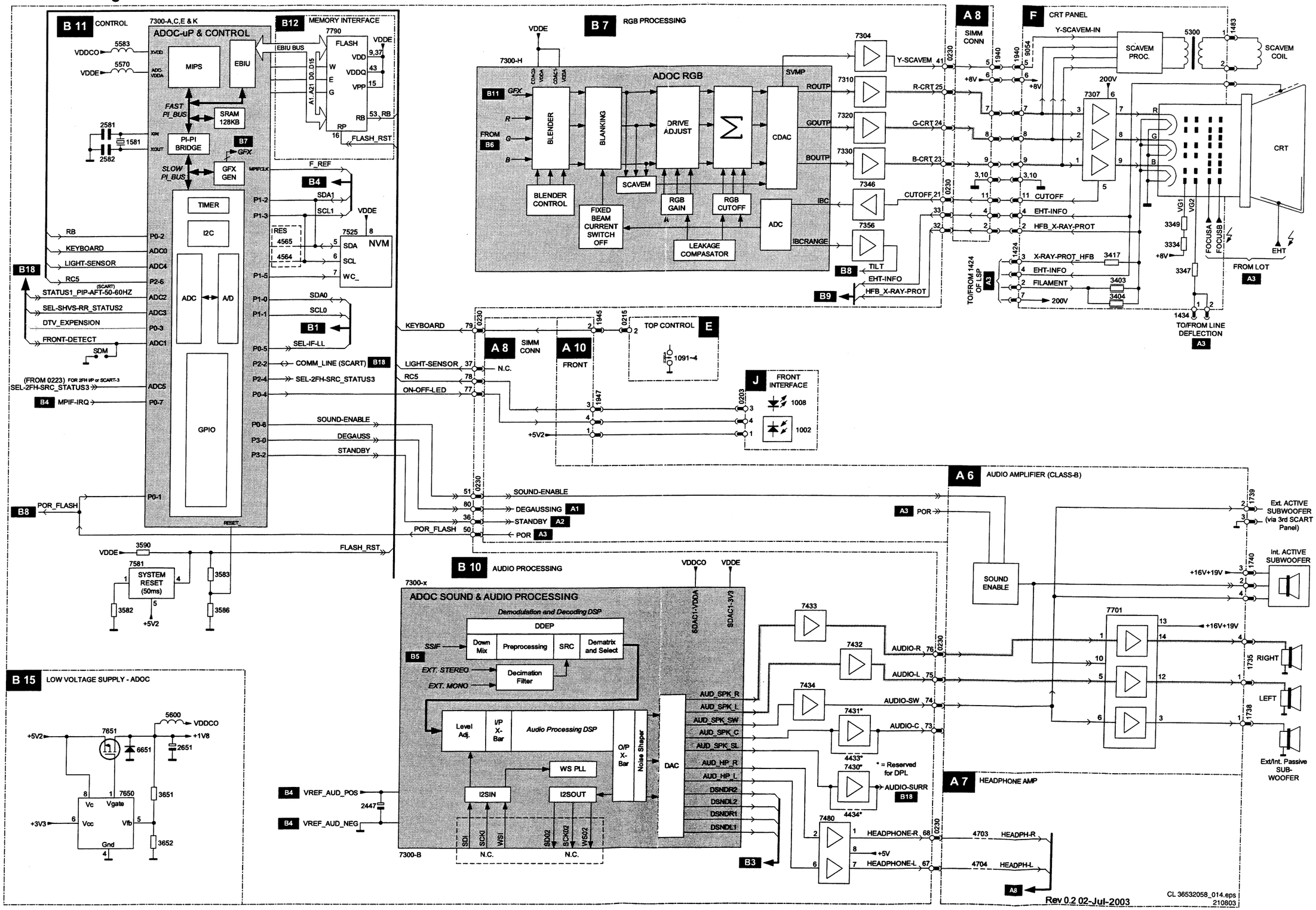
071003

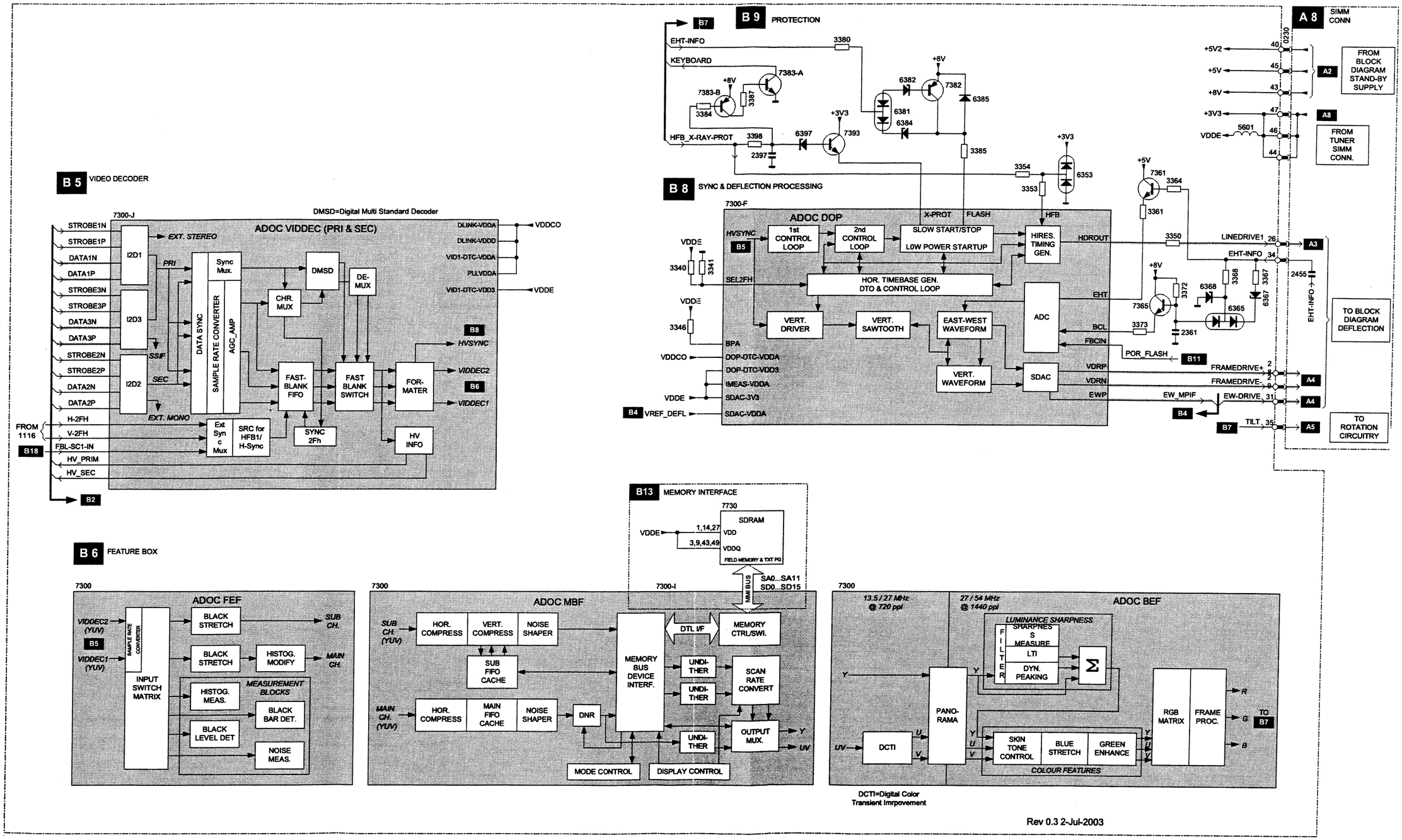
Block Diagram 1 Audio & Video



Block Diagram 2 Audio & Video



Block Diagram 3 Audio & Video



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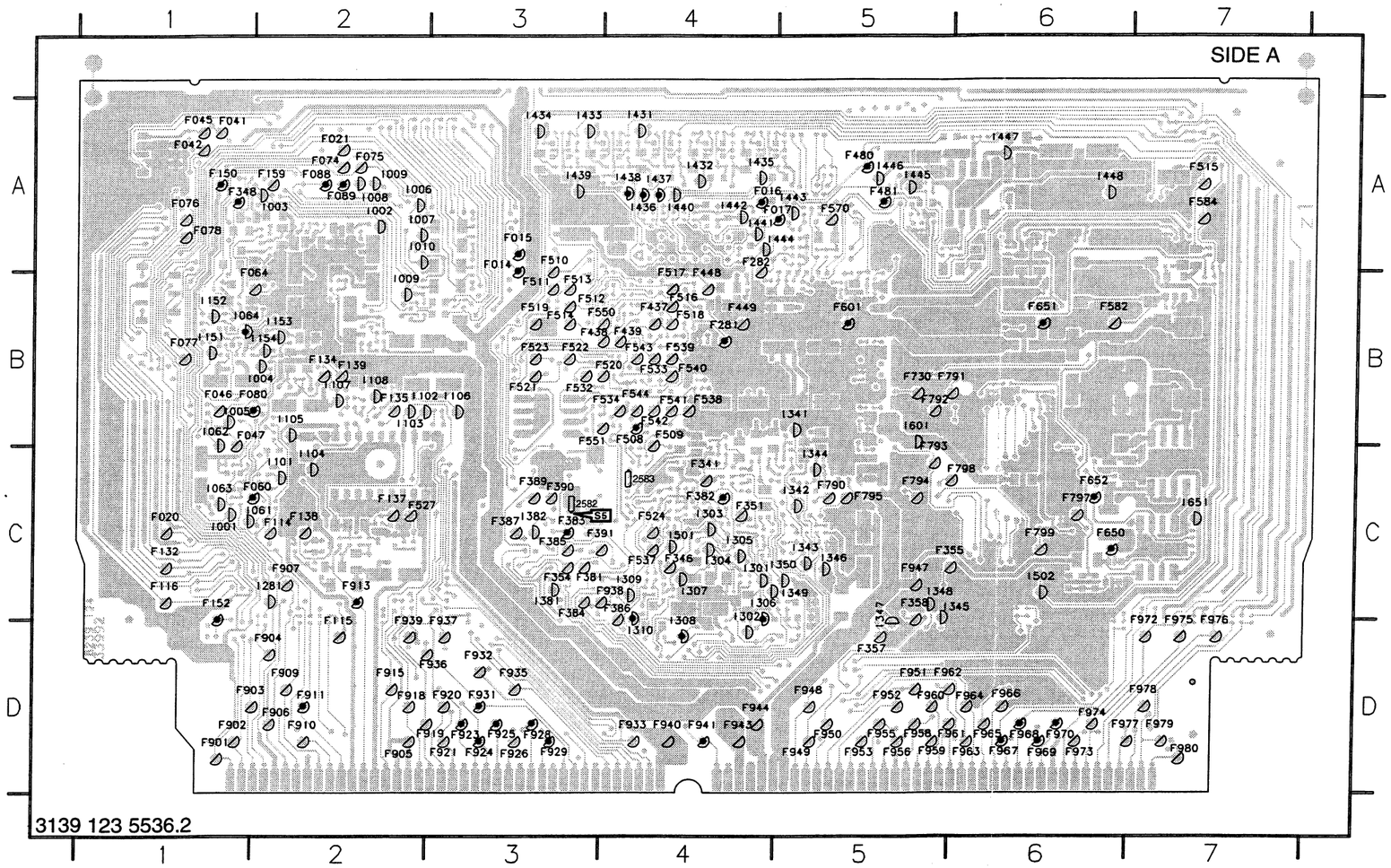
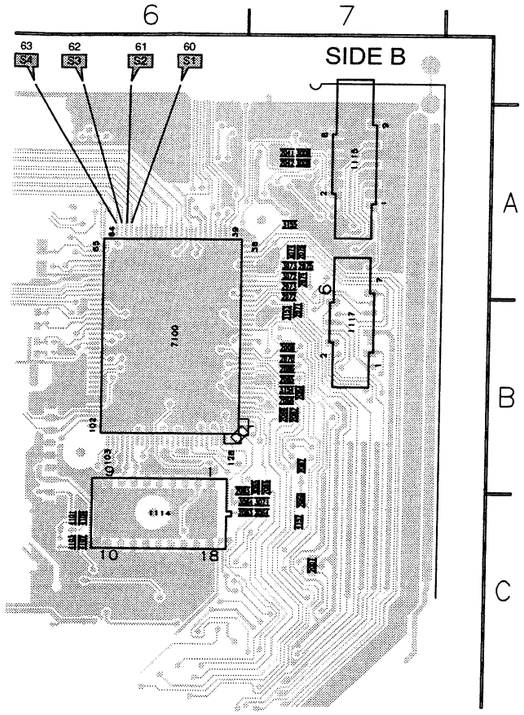
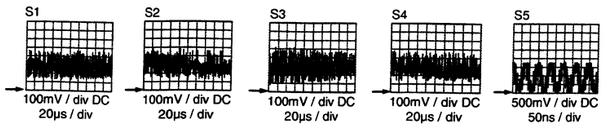
210803

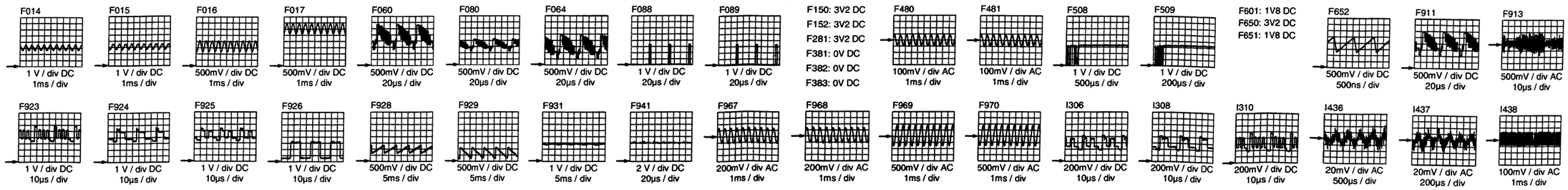
Testpoint Overview SSB

1009 A2	F064 B1	F134 B2	F351 C4	F390 C3	F512 B3	F527 C2	F551 B3	F794 C5	F910 D2	F929 D3	F947 C5	F962 D5	F976 D7	I009 B2	I108 B2	I308 D4	I381 C3	I442 A4
F014 A3	F074 A2	F135 B2	F354 C3	F391 C3	F513 B3	F532 B3	F570 A5	F795 C5	F911 D2	F931 D3	F948 D5	F963 D6	F977 D6	I010 A2	I151 B1	I309 C4	I382 C3	I443 A5
F015 A3	F075 A2	F137 C2	F355 C5	F437 B4	F514 B3	F533 B4	F582 B6	F797 C6	F913 C2	F932 D3	F949 D5	F964 D6	F978 D7	I061 C2	I152 B1	I310 D4	I431 A4	I444 A5
F016 A4	F076 A1	F138 C2	F357 D5	F438 B3	F515 A7	F534 B4	F584 A7	F798 C6	F915 D2	F933 D4	F950 D5	F965 D6	F979 D7	I062 B1	I153 B2	I341 B5	I432 A4	I445 A5
F017 A4	F077 B1	F139 B2	F358 C5	F439 B4	F516 B4	F537 C4	F601 B5	F799 C6	F918 D2	F935 D3	F951 D5	F966 D6	F980 D7	I063 C1	I154 B2	I342 C5	I433 A3	I446 A5
F020 C1	F078 A1	F150 A1	F381 C3	F448 B4	F517 B4	F538 B4	F650 C6	F901 D1	F919 D3	F936 D3	F952 D5	F967 D6	I001 C1	I064 B1	I281 C2	I343 C5	I434 A3	I447 A6
F021 A2	F080 B1	F152 C1	F382 C4	F449 B4	F518 B4	F539 B4	F651 B6	F902 D1	F920 D3	F937 D3	F953 D5	F968 D6	I002 A2	I101 C2	I301 C4	I344 C5	I435 A4	I448 A6
F041 A1	F088 A2	F159 A2	F383 C3	F480 A5	F519 B3	F540 B4	F652 C6	F903 D1	F921 D3	F938 C4	F955 D5	F969 D6	I003 A2	I102 B2	I302 C4	I345 C6	I436 A4	I501 C4
F042 A1	F089 A2	F281 B4	F384 C3	F481 A5	F520 B4	F541 B4	F730 B5	F904 D2	F923 D3	F939 D2	F956 D5	F970 D6	I004 B2	I103 B2	I303 C4	I346 C5	I437 A4	I502 C6
F045 A1	F114 C2	F282 A4	F385 C3	F508 B4	F521 B3	F542 B4	F790 C5	F905 D2	F924 D3	F940 D4	F958 D5	F972 D7	I005 B1	I104 C2	I304 C4	I347 C5	I438 A4	I601 B5
F046 B1	F115 D2	F341 C4	F386 C4	F509 B4	F522 B3	F543 B4	F791 B5	F906 D2	F925 D3	F941 D4	F959 D5	F973 D6	I006 A2	I105 B2	I305 C4	I348 C5	I439 A3	I651 C7
F047 B1	F116 C1	F346 C4	F387 C3	F510 A3	F523 B3	F544 B4	F792 B5	F907 C2	F926 D3	F943 D4	F960 D5	F974 D6	I007 A2	I106 B3	I306 C4	I349 C5	I440 A4	
F060 C2	F132 C1	F348 A1	F389 C3	F511 B3	F524 C4	F550 B3	F793 C5	F909 D2	F928 D3	F944 D4	F961 D6	F975 D7	I008 A2	I107 B2	I307 C4	I350 C5	I441 A4	









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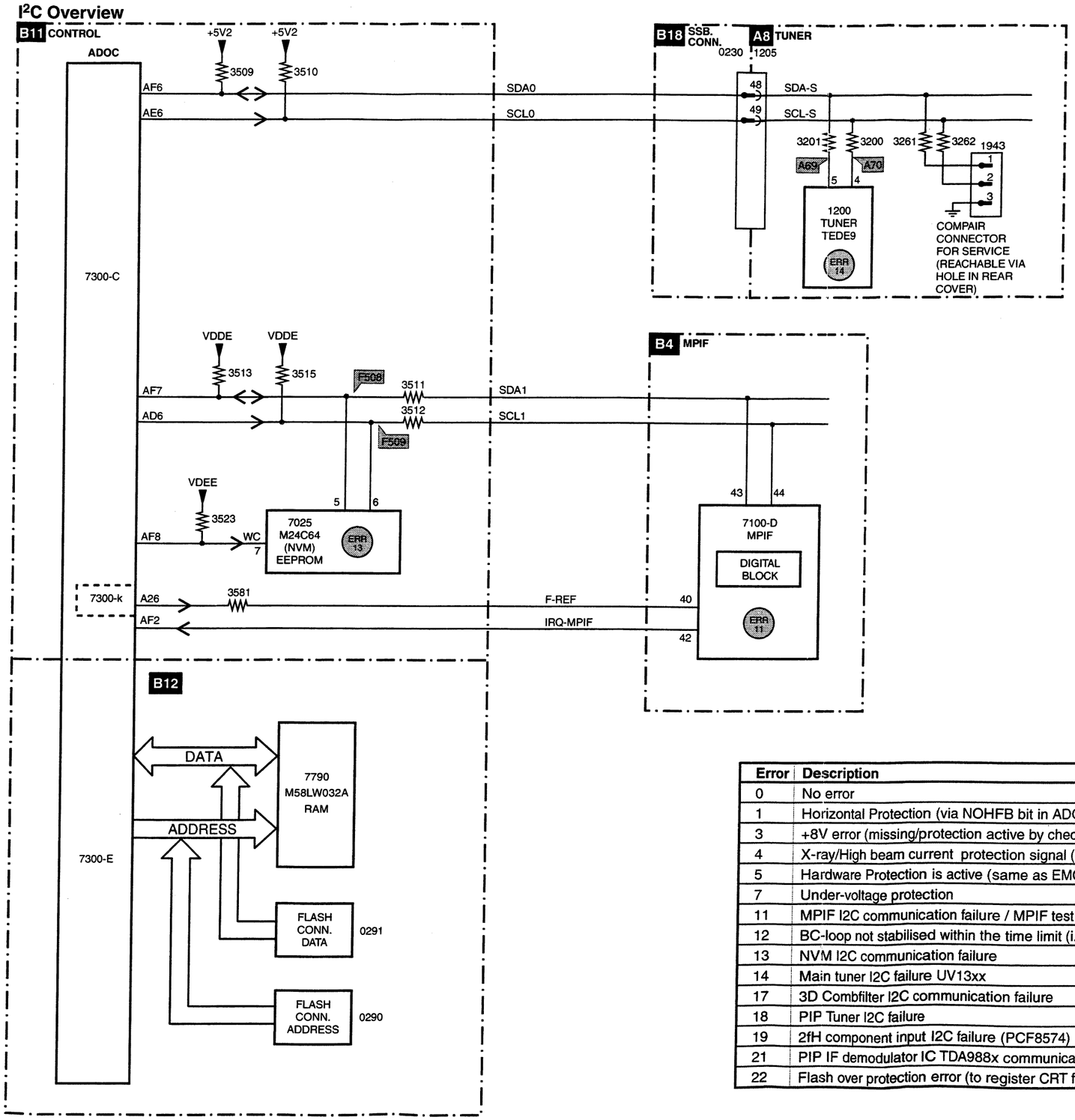
I2C Overview



Error	Description
0	No error
1	Horizontal Protection (via NOHFB bit in ADOC)
3	+8V error (missing/protection active by checking MPIF ASUP bit))
4	X-ray/High beam current protection signal (via XPROT bit in ADOC)
5	Hardware Protection is active (same as EMG)
7	Under-voltage protection
11	MPIF I2C communication failure / MPIF test failed
12	BC-loop not stabilised within the time limit (i.e. after timer is expired)
13	NVM I2C communication failure
14	Main tuner I2C failure UV13xx
17	3D Combfilter I2C communication failure
18	PIP Tuner I2C failure
19	2fH component input I2C failure (PCF8574)
21	PIP IF demodulator IC TDA988x communication failed (only for PIP/DW Sets)
22	Flash over protection error (to register CRT flash-overs, via FPR bit in ADOC)

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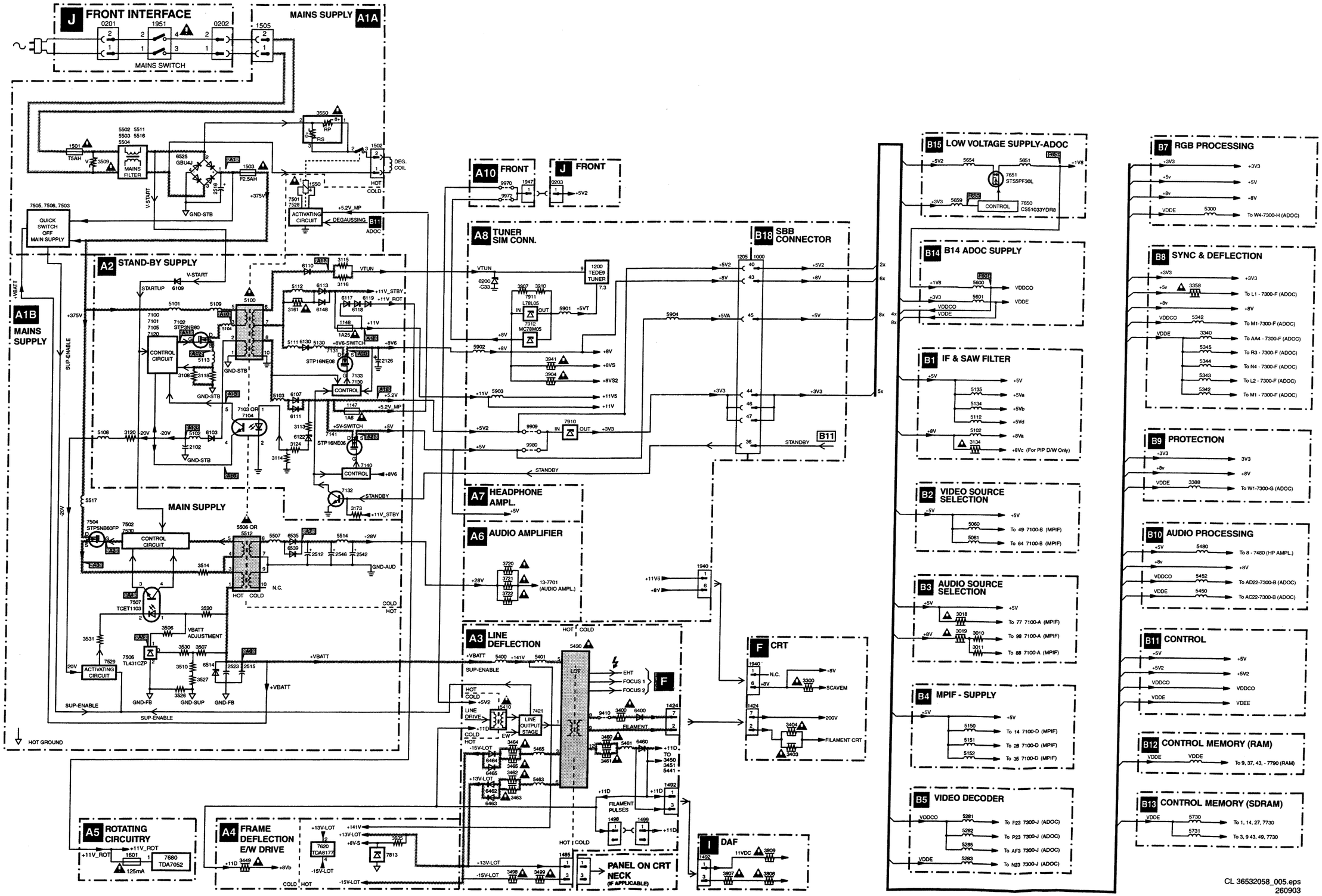
Supply Lines Overview



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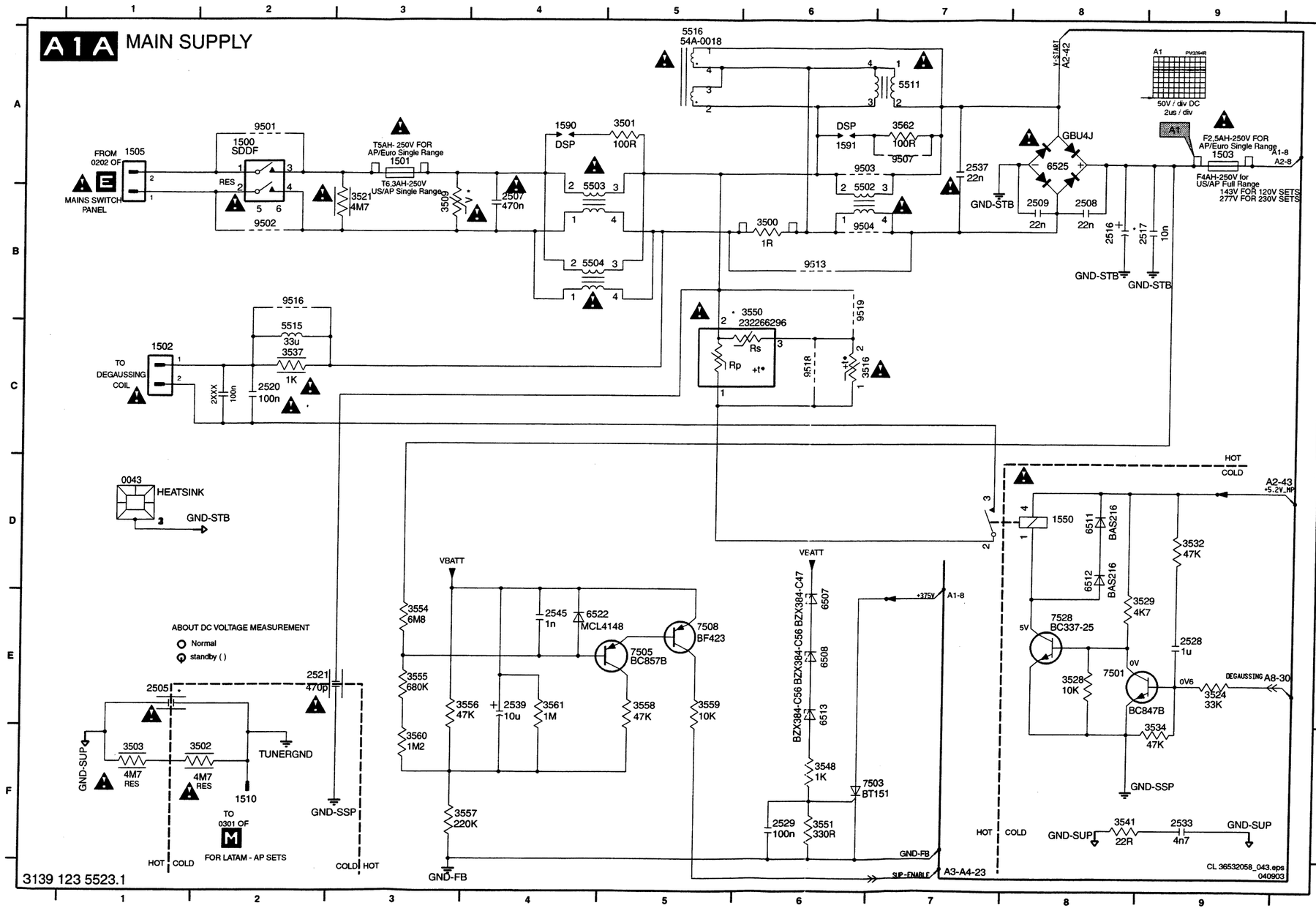
260903

7. Circuit Diagrams and PWB Layouts

Large Signal Panel: Main Supply

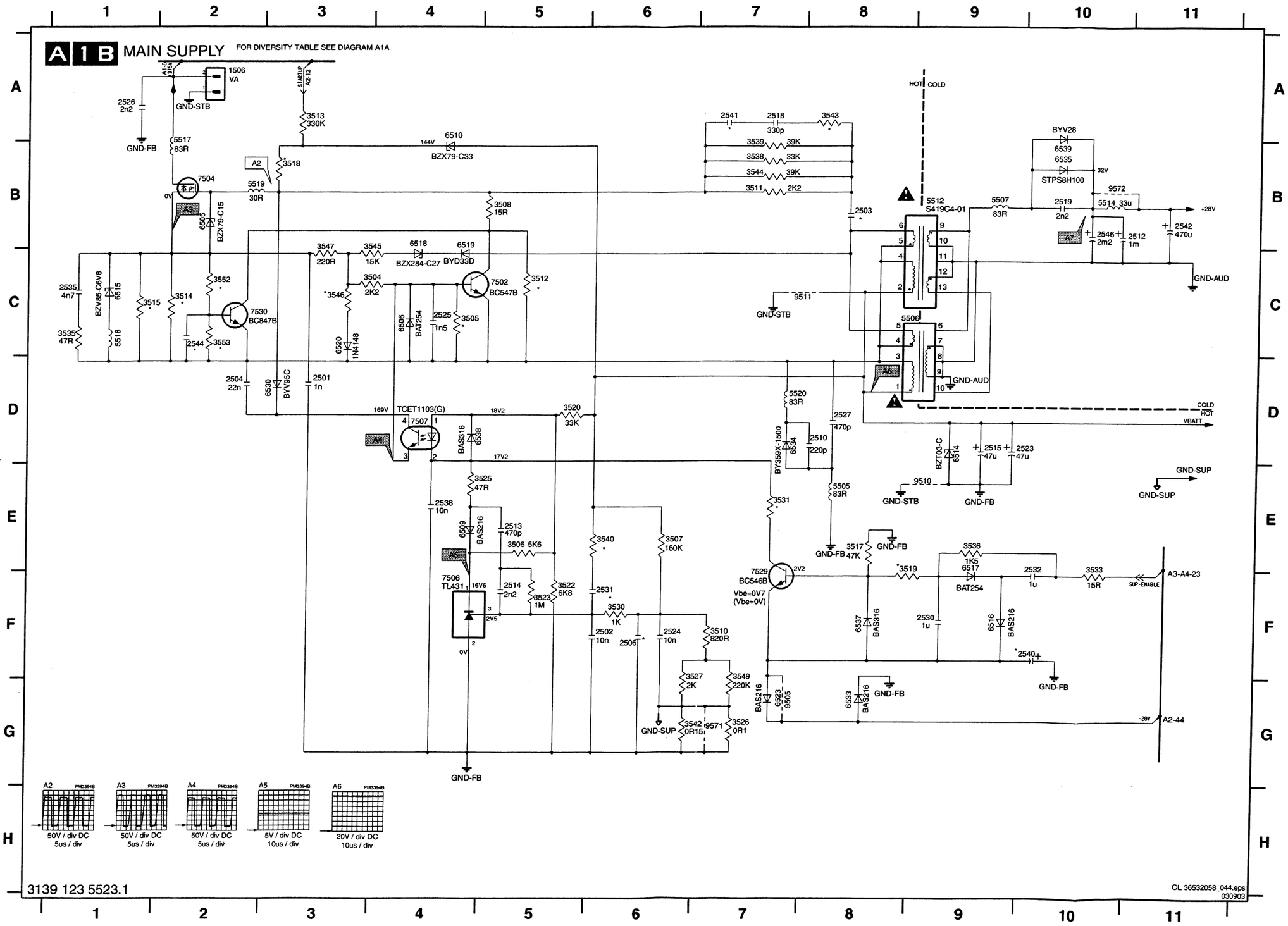


0043 D1	6513 E6
1500 A2	6522 E4
1501 A3	6525 A8
1502 C1	7501 E8
1503 A9	7503 F7
1505 A1	7505 E5
1510 F2	7508 E5
1550 D8	7528 E8
1590 A4	9501 A2
1591 A6	9502 B2
2505 E1	9503 A6
2507 B4	9504 B6
2508 B8	9507 A7
2509 B8	9513 B6
2516 B8	9516 B2
2517 B9	9518 C6
2520 C2	9519 B6
2521 E2	
2528 E9	
2529 F6	
2533 F9	
2537 A7	
2539 E4	
2545 E4	
2547 C2	
3500 B6	
3501 A5	
3502 F2	
3503 F1	
3509 B3	
3516 C6	
3521 B3	
3524 E9	
3528 E8	
3529 E9	
3532 D9	
3534 F9	
3537 C2	
3541 F8	
3548 F6	
3550 B6	
3551 F6	
3554 E3	
3555 E3	
3556 E4	
3557 F4	
3558 E5	
3559 E5	
3560 F3	
3561 E4	
3562 A7	
5502 B6	
5503 B4	
5504 B4	
5511 A7	
5515 C2	
5516 A5	
6507 E6	
6508 E6	
6511 D8	
6512 D8	

Item		Remarks	Bill/spe	NAFTA		China		AP single range		AP tail range		DESCRIPTION
1501			—	V	—	—		—		V		FUSE 5X20 HT 6A3 250V IEC B
1501			—	V	—	V		V		—		FUSE 5X20 HT 5A 250V IEC B
1503			—	V	—	V		—		V		FUSE 5X20 F 4A 250V IEC B
1503			—	V	—	V		V		—		FUSE 5X20 F 2A5 250V IEC B
1591			—	V	—	V		—		V		SURGE PROTECT DSP-501N-A21F A
2100	in A2		—	—	—	V		—		—		CERSAF KX 250V S 470P PM10 B
2100	in A2		—	V	—	V		—		—		CERSAF KX 250V S 1N PM20 B
2503			—	V	—	V		—		—		CAP MPOL 100V S 33N PM10 A
2503			—	V	—	—		—		V		CAP MPOL 100V S 39N PM5 A
2505			—	V	—	V		—		—		CERSAF KX 250V S 470P PM10 B
2505			—	—	—	V		—		V		CERSAF KX 250V S 1N PM20 B
2506			—	V	—	—		—		V		CAP POL 50V S 47N PM10 COL A
2515			—	V	—	—		—		—		ELCAP JA 200V S 47U P50M10 B
2515			—	V	—	—		—		—		ELCAP JA 200V S 47U P50M10 B
2515			—	—	—	V		—		—		ELCAP JA 200V S 47U P50M10 B
2515			—	—	—	V		—		V		ELCAP JA 200V S 47U P50M10 B
2516			—	—	—	—		—		V		ELCAP USR 400V S 470U PM20 B
2516			—	V	—	V		—		—		ELCAP LQ 450V S 220U PM20 B
2516			—	V	—	—		—		—		ELCAP USR 200V S 680U PM20 B
2516		V	—	—	—	V		—		—		ELCAP 057 400V S 220U PM20 B
2517		V	—	V	—	V		—		—		CAP MPOL 400V S 10N PM10 A
2518		V	—	V	—	V		—		—		CER2 DC B 500V S 100P COL A
2518		—	V	—	—	V		—		V		CER2 DC B 500V S 330P COL A
2521		—	V	—	—	V		—		V		CERSAF KX 250V S 1N PM20 B
2524		V	—	V	V	—		—		—		CER2 0603 X7R 50V 10N COL
2529		—	V	—	—	V		—		V		CER2 0603 Y5V 25V 100N COL
2531		—	V	—	V	V		—		—		CER2 DC B 500V S 1N COL A
2531		—	V	—	—	V		—		V		CER2 DC B 500V S 1N5 COL A
2539		—	V	—	—	—		—		V		ELCAP 5MM 35V 10U PM20 COL A
2540		V	—	V	V	—		—		—		ELCAP 50V S 1U PM20 COL A
2540		—	V	—	—	V		—		—		ELCAP 50V S 10U PM20 COL A
2541		V	—	V	V	—		—		—		CER2 DC B 500V S 100P COL A
2541		—	V	—	—	V		—		V		CER2 DC B 500V S 330P COL A
2544		—	V	—	—	V		—		V		CER2 0603 X7R 50V 1N COL
2544		V	—	V	V	—		—		—		CER2 0603 X7R 50V 2N2 COL
3500		—	V	—	V	V		—		—		RST WW 10W RMW10L S 0R56 PM5 B
3502		—	V	—	—	—		—		—		RST MGL VR37 A 4M7 PM5 A
3503		—	V	—	—	—		—		—		RST MGL VR37 A 4M7 PM5 A
3505		—	V	—	V	—		—		V		RST CRB 1/6W A 150K PM5 COL A
3505		V	—	V	V	—		—		—		RST CRB 1/6W A 22K PM5 COL A
3509		V	—	V	V	V		—		—		VDR DC 1MA/612V S MAX 1120V B
3509		—	V	—	—	—		—		V		VDR DC 1MA/423V S MAX 800V B
3512		V	—	V	V	—		—		—		RST SM 0603 220K PM5 COL
3512		—	V	—	—	V		—		—		RST SM 0603 330K PM5 COL
3514		V	—	V	V	—		—		—		RST MELM PR01 S 0R39 PM5 B
3514		—	V	—	—	V		—		—		RST POW 1W S 0R22 PM5 COL B
3515		V	—	V	V	—		—		—		RST MELM PR01 S 0R39 PM5 B
3515		—	V	—	—	V		—		—		RST POW 1W S 0R22 PM5 COL B
3518		—	V	—	—	V		—		—		RST MGL VR25 A 330K PM5 A
3518		V	—	V	V	—		—		—		RST CRB 1/6W A 100K PM5 COL A
3519		V	—	V	V	—		—		—		RST SM 0603 1K PM5 COL
3519		—	V	—	—	V		—		—		RST SM 0603 1K2 PM5 COL
3531		—	V	—	—	V		—		—		RST SM 0805 4K7 PM5 COL R
3531		V	—	V	V	—		—		—		RST SM 0805 6K8 PM5 COL R
3538		—	V	—	—	V		—		—		RST SM 0805 33K PM5 COL R
3539		—	V	—	—	V		—		—		RST SM 0805 39K PM5 COL R
3540		—	V	—	—	V		—		—		RST CRB 1/6W A 10K PM5 COL A
3540		V	—	V	V	—		—		—		RST CRB 1/6W A 33K PM5 COL A
3543		—	V	—	—	V		—		—		RST CRB 1/6W A 1K PM5 COL A

Large Signal Panel: Main Supply

A1B MAIN SUPPLY FOR DIVERSITY TABLE SEE DIAGRAM A1A



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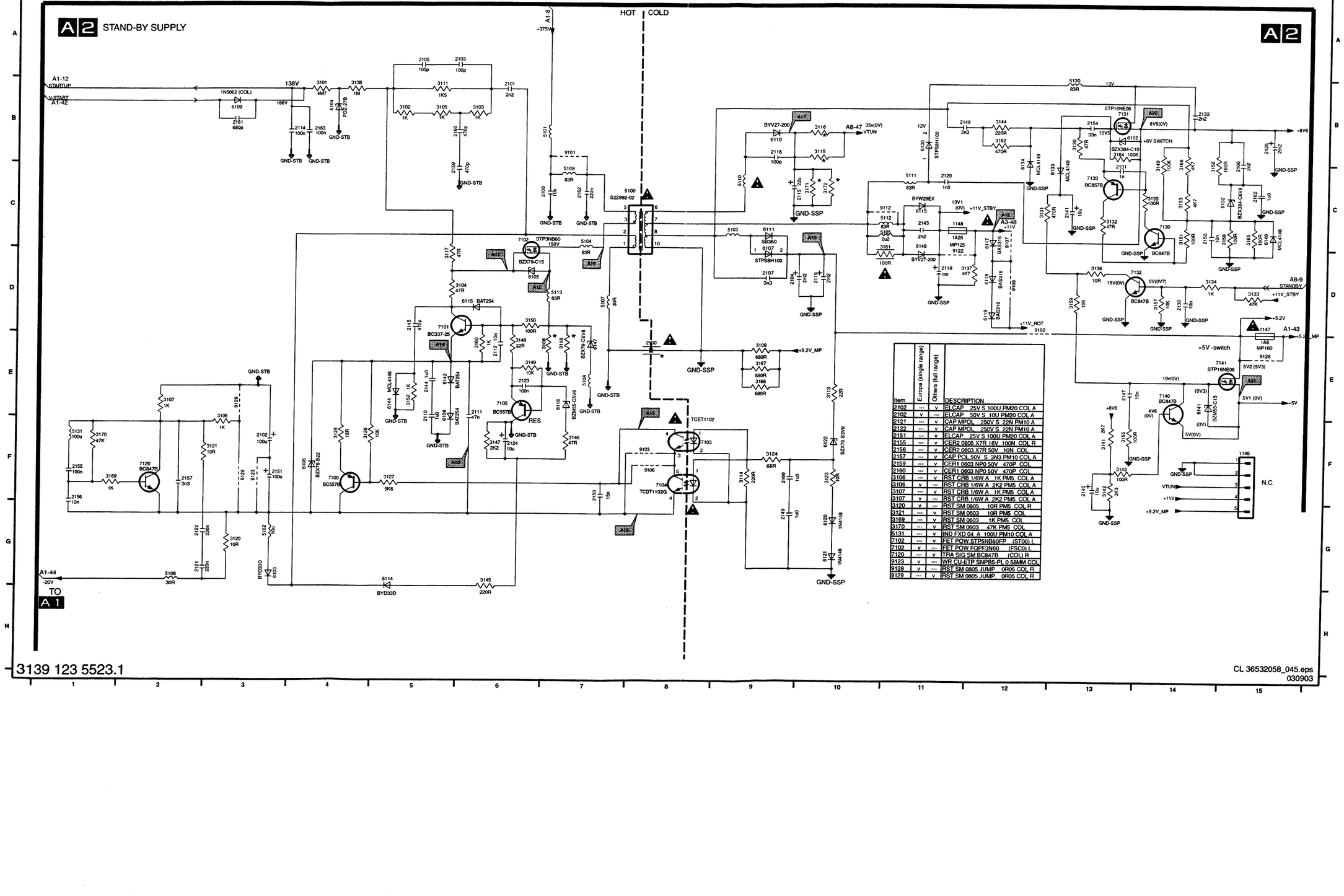
1506 A2
2501 D3
2502 F6
2503 B8
2504 D2
2506 F6
2510 D8
2512 B11
2513 E5
2514 F5
2515 D9
2518 A7
2519 B10
2523 D10
2524 F6
2525 C4
2526 A1
2527 D8
2530 F9
2531 F6
2532 F10
2535 C1
2538 E4
2540 F10
2541 A7
2542 B11
2544 C2
2546 B10
3504 C3
3505 C4
3506 E5
3507 E6
3508 B5
3510 F7
3511 B7
3512 C5
3513 A3
3514 C2
3515 C1
3517 E8
3518 B3
3519 F8
3520 D5
3522 F5
3523 F5
3525 E5
3526 G7
3527 F7
3530 F6
3531 E7
3533 F10
3535 C1
3536 E9
3538 B7
3539 B7
3540 E6
3542 G7
3543 A8
3544 B7
3545 C3
3546 C3
3547 C3
3549 F7
3552 C2
3553 C2
5505 E8
5506 C8
5507 B9
5512 B9
5514 B10
5517 A2
5518 C1
5519 B2
5520 D7
6505 B2
6506 C4
6509 E4
6510 A4
6514 D9
6515 C1
6516 F9
6517 E9
6518 B4
6519 B4
6520 C3
6523 G7
6530 D3
6533 G8
6534 D7
6535 B10
6537 F8
6538 D4
6539 B10
7502 C5
7504 B2
7506 F4
7507 D4
7529 F7
7530 C2
9505 G7
9510 E9
9511 C7
9571 G7
9572 B10

Large Signal Panel: Standby Supply

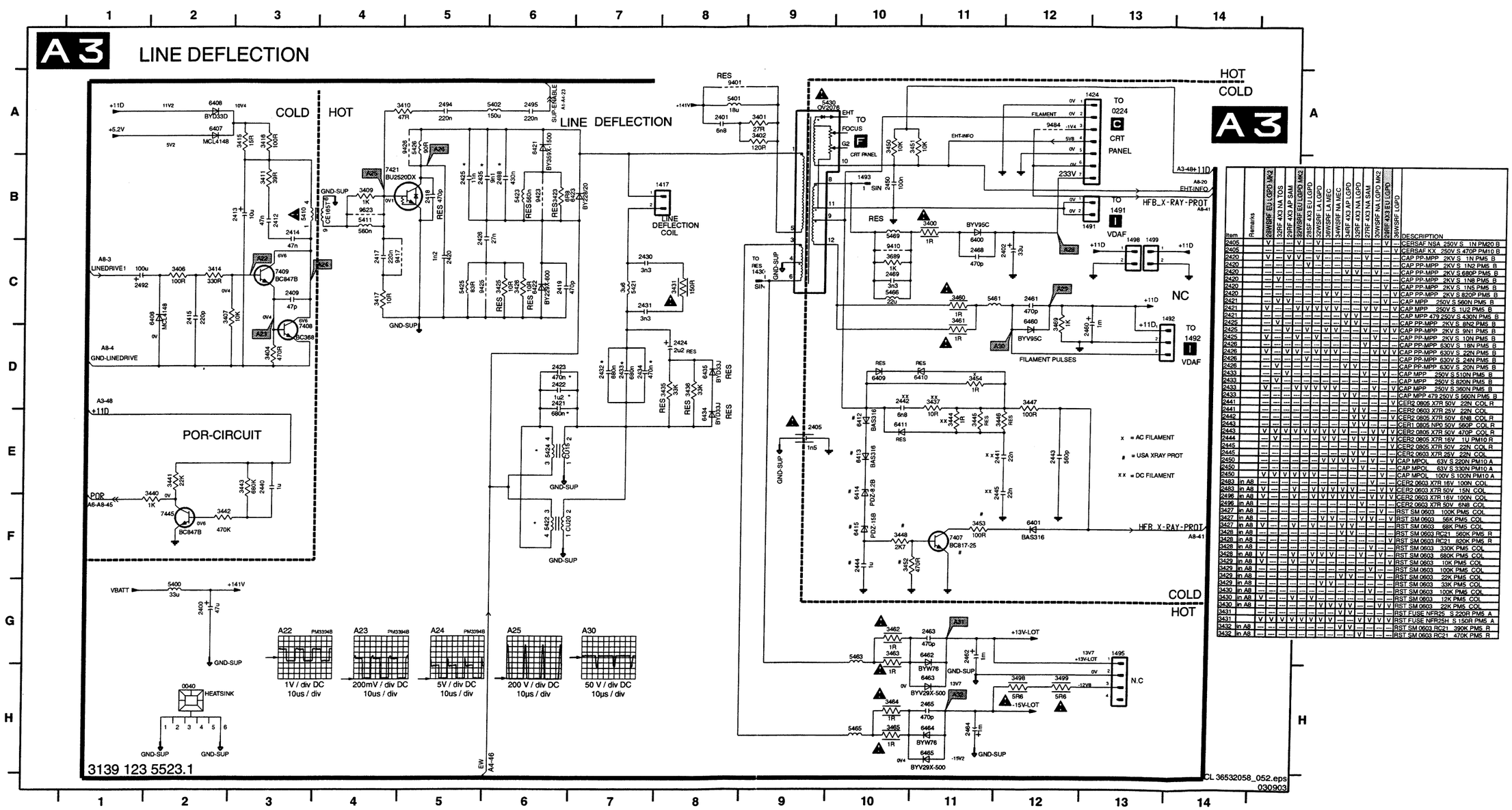
1146 F15 2103 A5 2109 F9 2116 B9 2123 E6 2140 F13 2148 B11 2154 B13 2161 B3 3104 D6 3111 B5 3118 E7 3126 F4 3134 D14 3141 F13 3147 F6 3153 C14 3160 E6 3167 E9 5100 C7 5106 G2 5112 C10 6105 D6 6111 C9 6117 C12 6130 B11 6144 E5 7102 C6 7131 B13 9102 D12 9122 D11
1147 D15 2104 D9 2110 E5 2118 D11 2124 F6 2141 C13 2149 G9 2155 F1 2162 C15 3106 F3 3114 F9 3121 F3 3130 B13 3136 D13 3143 F13 3149 E6 3156 C14 3162 B12 3169 F1 5102 G3 5107 D7 5108 E7 5130 B13 6107 D9 6113 C11 6119 D12 6133 C12 6148 C11 7104 F8 7133 C13 9106 F8 9123 F3
2100 E8 2105 A5 2111 E6 2119 D10 2125 B15 2143 C11 2150 C14 2156 F1 2163 B4 3106 F3 3114 F9 3121 F3 3130 B13 3136 D13 3143 F13 3149 E6 3156 C14 3162 B12 3169 F1 5102 G3 5107 D7 5108 E7 5130 B13 6107 D9 6113 C11 6119 D12 6133 C12 6148 C11 7104 F8 7133 C13 9106 F8 9126 E15
2101 B6 2106 B15 2112 E6 2120 C11 2130 D14 2144 E5 2151 F3 2157 F2 3101 B4 3107 E2 3115 B10 3123 F10 3131 C12 3137 D11 3144 B12 3150 D6 3157 D14 3164 B13 3170 F1 5103 C9 5109 C7 5131 F1 6108 E5 6114 G5 6120 G10 6134 B12 6149 C15 7105 E6 7140 E14 9107 C12 9128 F3
2101 B6 2107 D9 2114 B4 2121 G2 2131 C13 2145 D5 2152 C7 2159 C5 3102 B5 3108 E7 3116 B10 3124 F9 3133 D15 3138 B4 3145 G6 3152 E5 3158 C15 3165 C15 3171 C10 5104 C7 5110 C9 6103 G3 6109 B3 6115 D6 6121 G10 6141 E14 7100 F4 7120 F2 7141 E14 9108 D12 9129 E3
2102 F3 2108 C6 2115 C9 2122 G2 2132 B14 2147 E13 2153 F7 2160 B5 3103 B6 3109 E9 3117 D5 3125 F4 3133 D15 3140 C14 3146 F7 3152 E5 3159 D13 3166 E9 3172 C10 5105 C10 5111 C11 6104 B4 6110 B9 6116 E7 6122 F10 6142 E5 7101 D5 7130 C14 9101 B7 9112 C10



Item	Europe (single range)	Others (full range)	DESCRIPTION
2102	---	v	ELCAP 25V S 100U PM20 COL A
2102	v	---	ELCAP 50V S 10U PM20 COL A
2121	---	v	CAP MPOL 250V S 22N PM10 A
2122	---	v	CAP MPOL 250V S 22N PM10 A
2151	---	v	ELCAP 25V S 100U PM20 COL A
2155	---	v	CER2 0805 X7R 16V 100N COL R
2156	---	v	CER2 0603 X7R 50V 10N COL
2157	---	v	CAP POL 50V S 3N3 PM10 COL A
2159	---	v	CER1 0603 NP0 50V 470P COL
2160	---	v	CER1 0603 NP0 50V 470P COL
3106	---	v	RST CRB 1/6W A 1K PM5 COL A
3106	v	---	RST CRB 1/6W A 2K2 PM5 COL A
3107	---	v	RST CRB 1/6W A 1K PM5 COL A
3107	v	---	RST CRB 1/6W A 2K2 PM5 COL A
3120	v	---	RST SM 0805 10R PM5 COL R
3121	---	v	RST SM 0603 10R PM5 COL
3169	---	v	RST SM 0603 1K PM5 COL
3170	---	v	RST SM 0603 47K PM5 COL
5131	---	v	IND FXD 04 A 100U PM10 COL A
7102	---	v	FET POW STP5NB60FP (ST00) L
7102	v	---	FET POW FQPF3N60 (FSC0) L
7120	---	v	TRA SIG SM BC847B (COL) R
9123	v	---	WR CU-ETP SNPB5-PL 0.58MM COL
9128	v	---	RST SM 0805 JUMP 0R05 COL R
9129	---	v	RST SM 0805 JUMP 0R05 COL R

Large Signal Panel: Line Deflection

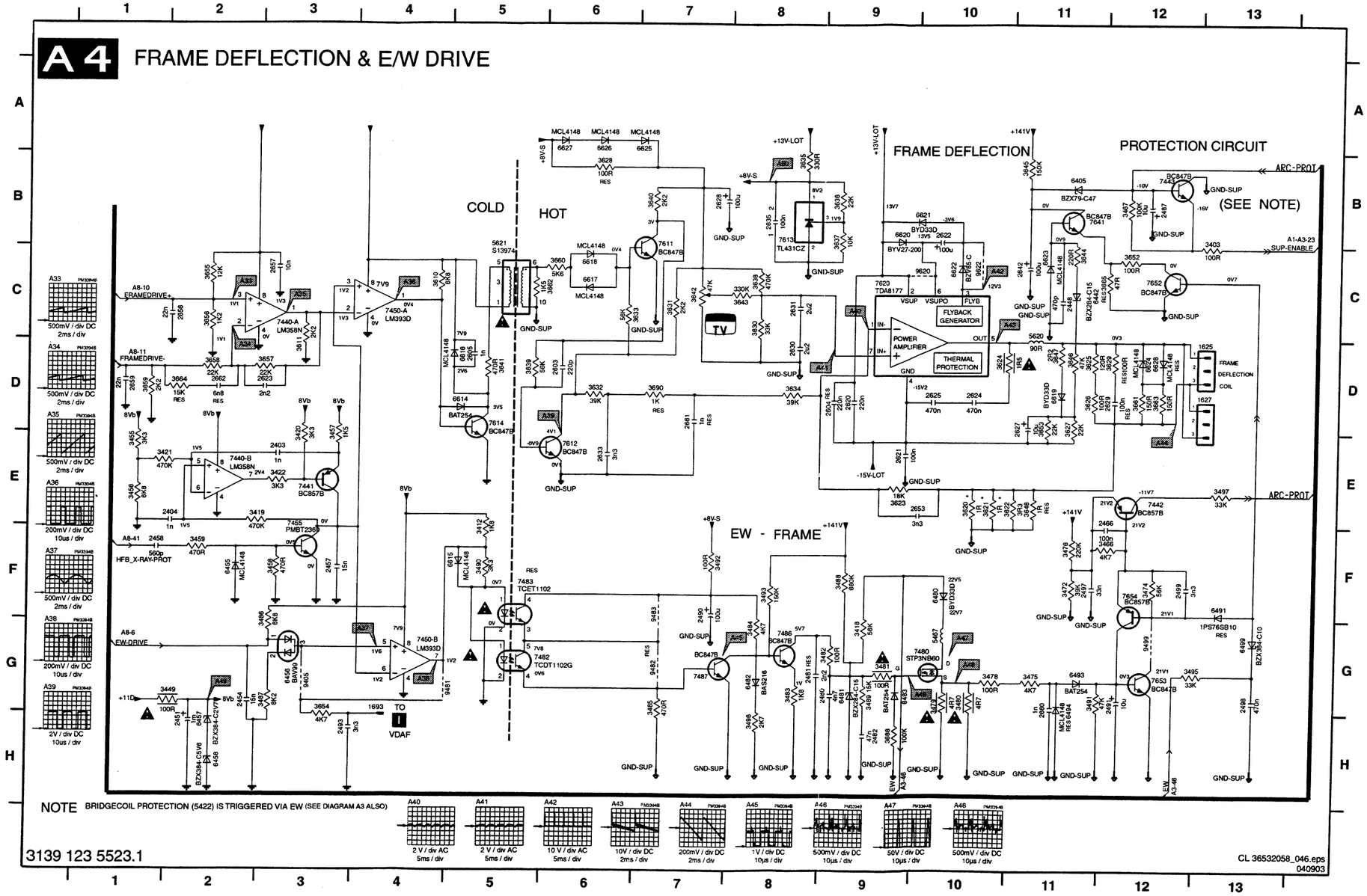
0040 H2	1492 C13	2400 G2	2412 B3	2418 B5	2423 D6	2431 C7	2440 E3	2445 E12	2463 G11	2488 B6	3401 A9	3409 B4	3416 A3	3431 C8	3441 E2	3446 E12	3452 F10	3462 G10	3498 H12	5402 A6	5423 B6	5461 C11	6400 B11	6409 D10	6414 E10	6434 E8	6464 H11	7421 B4	9423 B6
1417 B7	1493 B10	2401 A8	2413 B3	2419 C6	2424 D8	2432 D7	2441 E12	2450 B10	2464 H11	2492 C1	3402 A9	3410 A4	3417 C4	3435 D8	3442 F2	3447 D12	3453 F11	3463 G10	3499 H12	5410 B3	5424 E6	5463 G10	6401 F12	6410 D11	6415 F10	6435 D8	6465 H11	7445 F2	9425 C5
1424 A12	1495 G13	2402 C12	2414 B3	2420 C5	2425 B5	2433 D7	2442 D10	2460 D13	2465 H11	2494 A5	3404 D3	3411 B3	3423 B6	3436 D8	3443 E3	3448 F10	3454 D11	3464 H10	3699 C10	5411 B4	5425 C5	5465 H10	6406 C2	6411 E10	6421 A6	6460 C12	7407 F11	9401 A8	9426 A5
1430 C9	1498 C13	2405 E9	2415 C2	2421 D6	2426 B5	2434 D7	2443 E12	2461 C12	2468 C11	2495 A6	3406 C2	3414 C2	3425 C6	3437 D11	3444 E11	3450 A10	3460 C11	3465 H10	5400 G2	5421 C7	5426 A5	5466 C10	6407 A2	6412 E10	6422 C6	6462 G11	7408 D3	9410 C10	9484 A12
1491 B13	1499 C13	2409 C3	2417 C4	2422 D6	2430 C7	2435 B5	2444 F10	2462 G11	2469 C10	3400 B11	3407 C2	3415 A3	3426 C6	3440 F2	3445 E11	3451 A10	3461 C11	3469 D12	5401 A8	5422 F6	5430 A9	5469 B10	6408 A2	6413 E10	6423 B6	6463 H11	7409 C3	9417 C4	9623 B4



Item	Remains	22NHSRF EU LGPD MK2	33RF 4X3 NA TOS	39RF 4X3 AP SAM	47RSRF 4X3 EU LGPD MK2	56RSRF 4X3 EU LGPD	68NHSRF LA MEC	82NHSRF HA MEC	14HF 4X3 AP LGPD	22HF 4X3 NA LGPD	27HF 4X3 NA LGPD MK2	30NHSRF NA LGPD	39RF 4X3 EU LGPD	56NHSRF LGPD		DESCRIPTION
2405		—	—	—	—	—	—	—	—	—	—	—	—	V	—	CERSAF NSA 250V S 1N PM20 B
2405		—	—	—	—	—	—	—	—	—	—	—	—	—	V	CERSAF KX 250V S 470P PM10 B
2420		—	V	—	V	V	—	V	—	—	—	V	—	—	—	CAP PP-MPP 2KV S 1N PM5 B
2420		—	—	—	—	V	—	—	—	—	—	—	—	—	—	CAP PP-MPP 2KV S 1N2 PM5 B
2420		—	—	—	—	—	—	—	—	V	V	—	—	—	—	CAP PP-MPP 2KV S 680P PM5 B
2420		—	V	—	—	—	—	—	—	—	—	—	—	—	—	CAP PP-MPP 2KV S 1N8 PM5 B
2420		—	—	—	—	—	—	—	—	—	—	—	—	V	—	CAP PP-MPP 2KV S 1N5 PM5 B
2420		—	V	—	V	V	—	—	—	—	—	—	—	—	V	CAP PP-MPP 2KV S 820P PM5 B
2421		—	—	—	—	—	—	—	—	—	—	—	—	V	—	CAP MPP 250V S 560N PM5 B
2421		V	—	—	V	V	V	V	V	V	V	—	—	—	V	CAP MPP 250V S 1U2 PM5 B
2421		—	—	—	—	—	—	—	V	V	—	—	—	—	—	CAP MPP 479 250V S 430N PM5 B
2425		—	V	—	—	—	—	—	—	—	—	—	—	—	—	CAP PP-MPP 2KV S 8N2 PM5 B
2425		—	—	—	—	—	—	—	—	—	—	—	—	V	—	CAP PP-MPP 2KV S 9N1 PM5 B
2425		V	—	—	V	V	—	—	—	—	—	—	—	—	—	CAP PP-MPP 2KV S 10N PM5 B
2426		—	—	—	—	—	—	—	—	—	—	—	—	V	—	CAP PP-MPP 630V S 18N PM5 B
2426		V	—	—	V	V	—	—	V	V	V	V	—	—	V	CAP PP-MPP 630V S 22N PM5 B
2426		—	—	—	—	—	—	—	—	—	—	—	—	—	V	CAP PP-MPP 630V S 24N PM5 B
2426		—	V	—	—	—	—	—	V	V	—	—	—	—	—	CAP PP-MPP 630V S 20N PM5 B
2433		—	—	—	V	—	—	—	—	—	—	V	—	V	—	CAP MPP 250V S 510N PM5 B
2433		—	V	—	—	—	—	—	—	—	—	—	—	—	—	CAP MPP 250V S 820N PM5 B
2433		V	—	—	V	V	V	V	V	V	V	—	—	—	V	CAP MPP 250V S 360N PM5 B
2433		—	—	—	—	—	—	—	V	V	—	—	—	—	—	CAP MPP 479 250V S 560N PM5 B
2441		—	—	—	—	—	—	—	—	—	—	—	—	V	—	CER2 0805 X7R 50V 22N COL R
2441		—	—	—	—	—	—	—	V	V	—	—	—	—	—	CER2 0603 X7R 25V 22N COL
2442		—	—	—	—	—	—	—	V	V	—	—	—	—	V	CER2 0805 X7R 50V 6N8 COL R
2443		V	V	V	V	V	V	V	V	V	—	V	V	V	—	CER1 0805 NP0 50V 560P COL R
2443		V	V	V	V	V	V	V	V	V	—	V	V	V	—	CER2 0805 X7R 50V 470P COL R
2444		—	—	—	—	—	—	—	—	—	—	—	—	V	—	CER2 0805 X7R 16V 1U PM10 R
2445		—	—	—	—	—	—	—	—	—	—	—	—	V	—	CER2 0805 X7R 50V 22N COL R
2445		—	—	—	—	—	—	—	V	V	—	—	—	—	—	CER2 0603 X7R 25V 22N COL
2450		—	—	—	—	—	—	—	V	V	V	V	V	—	V	CAP MPOL 63V S 220N PM10 A
2450		—	—	—	—	—	—	—	—	—	—	—	—	V	—	CAP MPOL 63V S 330N PM10 A
2450		V	V	V	V	V	V	—	—	—	—	—	—	—	V	CAP MPOL 100V S 100N PM10 A
2483	in A8	—	—	—	—	—	—	—	—	—	—	V	—	—	—	CER2 0603 X7R 16V 100N COL
2483	in A8	V	—	—	V	—	V	V	V	V	V	—	—	V	V	CER2 0603 X7R 50V 15N COL
2496	in A8	V	—	—	V	—	V	V	V	V	V	—	—	V	V	CER2 0603 X7R 16V 100N COL
2496	in A8	—	—	—	—	—	—	—	—	—	V	—	—	—	—	CER2 0603 X7R 50V 6N8 COL
3427	in A8	—	—	—	—	—	—	—	—	—	—	—	V	—	—	RST SM 0603 100K PM5 COL
3427	in A8	—	—	—	—	—	—	—	V	V	—	—	—	V	—	RST SM 0603 56K PM5 COL
3427	in A8	V	—	—	V	—	V	V	V	V	—	V	—	—	—	RST SM 0603 68K PM5 COL
3428	in A8	—	—	—	—	—	—	—	V	V	—	—	—	—	—	RST SM 0603 RC21 560K PM5 R
3428	in A8	—	—	—	—	—	—	—	—	—	—	—	—	V	—	RST SM 0603 RC21 820K PM5 R
3428	in A8	—	—	—	—	—	—	—	—	—	—	V	—	—	—	RST SM 0603 330K PM5 COL
3428	in A8	V	—	—	V	—	V	V	V	V	—	V	—	V	—	RST SM 0603 680K PM5 COL
3429	in A8	V	—	—	V	—	V	V	—	—	—	—	—	V	—	RST SM 0603 10K PM5 COL
3429	in A8	—	—	—	—	—	—	—	—	—	—	V	—	—	—	RST SM 0603 100K PM5 COL
3429	in A8	—	—	—	—	—	—	—	V	V	—	—	—	V	—	RST SM 0603 22K PM5 COL
3429	in A8	—	—	—	—	—	—	—	—	—	—	V	—	—	—	RST SM 0603 33K PM5 COL
3430	in A8	—	—	—	—	—	—	—	—	—	—	—	V	—	—	RST SM 0603 100K PM5 COL
3430	in A8	V	—	—	V	—	V	V	—	—	—	—	—	V	—	RST SM 0603 12K PM5 COL
3430	in A8	—	—	—	—	—	—	—	V	V	V	V	—	—	V	RST SM 0603 22K PM5 COL
3431		—	V	V	V	V	V	V	—	—	V	V	V	—	V	RST FUSE NFR25 S 250R PM5 A
3432	in A8	—	—	—	—	—	—	—	V	V	—	—	—	—	—	RST SM 0603 RC21 390K PM5 R
3432	in A8	—	—	—	—	—	—	—	—	—	—	V	—	—	—	RST SM 0603 RC21 470K PM5 R

Large Signal Panel: Frame Deflection & E/W Drive

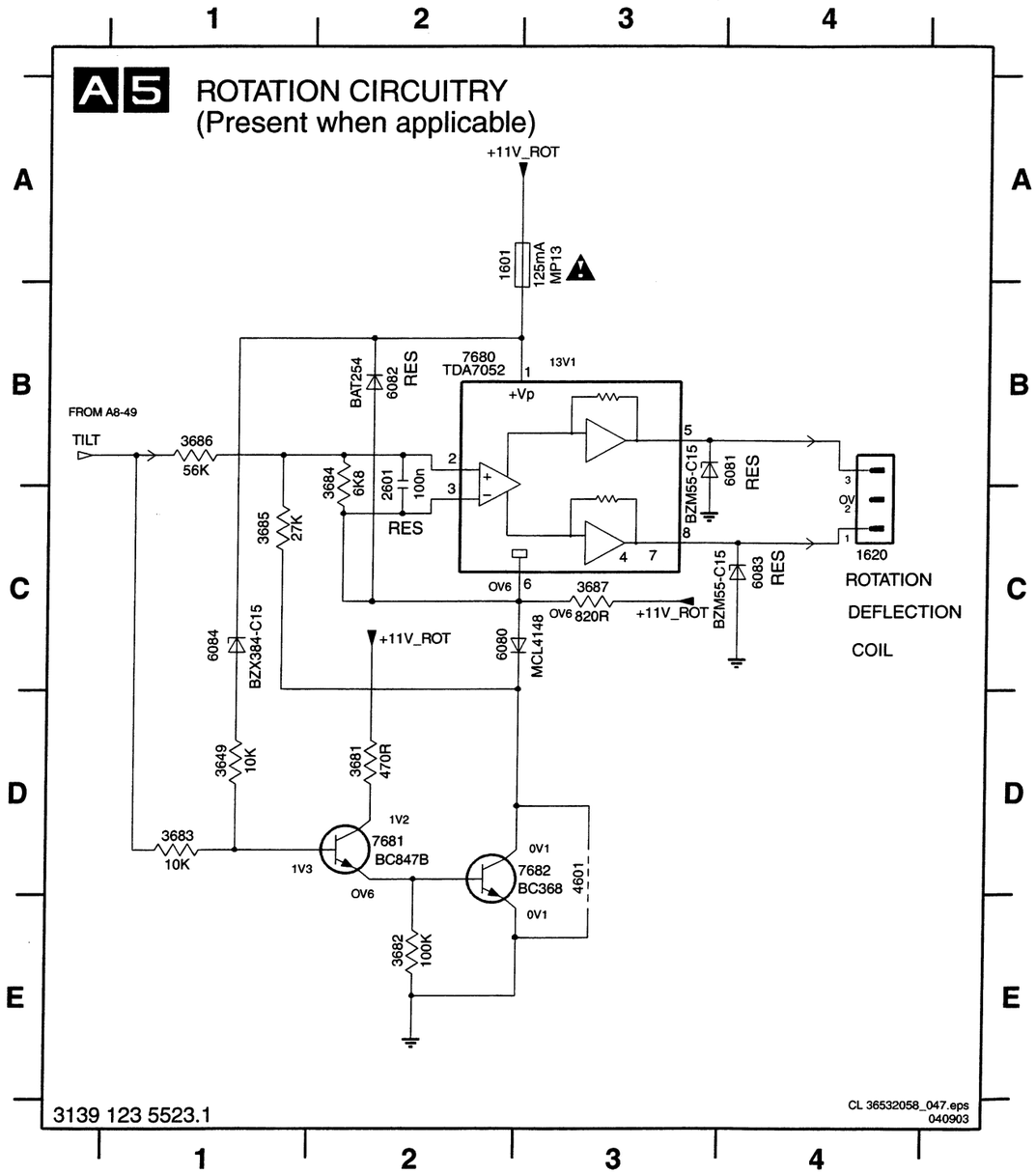
1625 D12	2457 F3	2491 G12	2620 D9	2629 D12	2657 C3	3419 E2	3458 F3	3478 G10	3486 G3	3495 G12	3623 E9	3631 C7	3639 D5	3647 D11	3658 D2	3688 H9	6456 G3	6483 G11	6519 D11	6637 A6	7450-B G4	7612 E6	9405 G3
1627 D12	2458 F1	2493 H3	2621 E9	2630 D8	2659 D1	3420 E3	3459 F2	3479 G10	3487 G3	3496 H8	3624 D10	3632 D6	3640 B7	3648 E11	3659 D1	3690 D7	6457 H2	6494 G11	6620 B9	6628 D12	7455 F3	7613 B8	9481 G4
1693 G4	2466 E12	2497 F11	2622 B10	2631 C8	2660 G11	3421 E1	3466 F12	3480 G10	3488 F9	3497 E13	3625 D11	3633 C6	3641 D5	3652 C12	3660 C6	5467 G10	6458 H2	6499 G13	6621 B10	7440-A C3	7480 G10	7614 D5	9482 G7
2403 E3	2480 G9	2498 G13	2623 D3	2633 E6	2661 D7	3422 E3	3467 B12	3481 G9	3489 G9	3610 C4	3626 D11	3634 D6	3642 C7	3653 D11	3661 D12	5620 C11	6480 F10	6614 D5	6622 C10	7440-B E2	7482 G5	7620 C9	9483 F7
2404 E2	2481 G8	2499 F12	2624 D10	2635 B8	2662 D2	3449 G2	3472 F11	3482 G9	3490 F5	3611 D3	3627 D11	3635 B8	3643 C8	3654 G3	3662 C6	5621 C5	6481 G9	6615 F5	6623 C11	7441 E3	7483 F5	7652 C12	9499 G12
2448 C11	2482 H9	2603 D6	2625 D10	2642 C11	3403 B13	3455 E1	3474 F12	3483 G8	3491 G11	3620 E10	3628 B6	3636 B9	3644 C11	3655 C2	3663 D12	6405 B11	6482 G8	6616 D5	6624 D12	7442 E12	7496 G8	7652 C12	9620 C10
2451 H2	2487 B12	2604 D9	2627 D11	2653 E10	3412 F5	3456 E1	3475 G11	3484 G8	3492 F7	3621 E10	3629 D12	3637 B9	3645 B11	3656 C2	3664 D2	6442 C11	6483 G9	6617 C6	6625 A7	7443 B12	7487 G7	7653 G12	9622 C10
2454 G2	2490 F7	2605 D5	2628 B7	2656 C2	3418 G9	3457 E3	3476 F11	3485 G7	3493 F8	3622 E10	3630 C8	3638 C8	3646 D11	3657 D3	3665 C11	6455 F2	6491 F13	6618 C6	6626 A6	7450-A C4	7611 C7	7654 F12		



Item	2x32" WSRF LGPD	34/36" 43 RF TOSJ	29" 4:3 RF SMASK	26" 4:3 RF PHCO	36" WSRF NEC	32RF 4:3 NA LGPD	27RF 4:3 NA SAM	30WSRF NA LGPD	34 4:3RF AP LGPD	32WSRF LGPD MKII	32RF EU LGPD	28WSRF LGPD	DESCRIPTION
1625	V	V	--	--	--	V	V	V	V	V	V	--	CON V 3P M 2.50 BK EH-A B
1627	--	--	--	--	--	--	--	--	--	--	--	V	CON V 3P M 2.50 BK EH-A B
2490	V	V	--	--	--	V	V	V	V	V	V	--	ELCAP 10V S 100U PM20 COL A
2498	V	V	--	--	--	V	V	V	V	V	V	V	ELCAP 50V S 100U PM50 COL A
2633	V	V	--	--	--	V	V	V	V	V	V	--	CER2 0805 X7R 16V 1U PM10 R
2633	--	--	V	V	V	--	--	--	--	--	--	--	CER2 0603 X7R 50V 3N3 COL
2653	--	--	--	--	--	--	--	--	--	--	--	V	CER2 0603 X7R 50V 6N8 COL
2653	--	--	V	V	V	--	--	--	--	--	--	--	CER2 0603 X7R 50V 2N7 PM10 R
2653	V	V	--	--	--	V	V	V	V	V	V	--	CER2 0603 X7R 50V 2N2 COL
2661	--	--	--	--	--	--	--	--	--	--	--	V	CER2 0603 X7R 50V 2N2 COL
2662	--	--	--	--	--	--	--	--	--	--	--	V	CER2 0603 X7R 50V 6N8 COL
3403	V	V	V	V	V	V	V	V	V	V	V	--	CER2 0603 X7R 50V 3N3 COL
3412	V	V	V	V	V	V	V	V	V	V	V	V	RST CRB 1/8W A 100R PM5 COL A
3418	V	V	V	V	V	V	V	V	V	V	V	--	RST SM 0603 1K2 PM5 COL
3418	V	V	V	V	V	V	V	V	V	V	V	--	RST MFLM MBB0207 A 47K PM1 A
3480	V	V	V	V	V	V	V	V	V	V	V	--	RST MFLM MBB0207 A 56K PM1 A
3480	--	--	--	--	--	--	--	--	--	--	--	V	RST FUSE NFR25 S 4R7 PM5 A
3480	--	--	--	--	--	--	--	--	--	--	--	V	RST FUSE NFR25 S 6R8 PM5 A
3483	V	--	V	V	V	V	V	V	V	V	V	V	RST SM 0603 1K8 PM5 COL
3484	--	V	--	--	--	--	--	--	--	--	--	--	RST SM 0603 2K2 PM5 COL
3488	V	--	V	V	V	V	V	V	V	V	V	V	RST SM 0603 4K7 PM5 COL
3488	--	V	--	--	--	--	--	--	--	--	--	--	RST MFLM MBB0207 A 1M PM1 A
3491	--	--	--	--	--	V	V	V	V	V	V	--	RST SM 0603 47K PM5 COL
3491	V	V	V	V	V	--	--	--	--	--	--	--	RST SM 0603 39K PM5 COL
3495	V	V	V	V	V	V	V	V	V	V	V	--	RST SM 0603 47K PM5 COL
3495	--	--	--	--	--	--	--	--	--	--	--	V	RST MFLM MBB0207 A 150K PM1 A
3620	--	--	--	--	--	--	--	--	--	--	--	V	RST MFLM MBB0207 A 1M PM1 A
3620	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB CFR25S A 1R8 PM5 A
3620	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB CFR25S A 1R5 PM5 A
3620	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB CFR25S A 1R2 PM5 A
3621	V	V	V	V	V	V	V	V	V	V	V	--	RST CRB 1/8W A 1R5 PM5 COL A
3621	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB CFR25S A 1R5 PM5 A
3621	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB CFR25S A 1R2 PM5 A
3621	V	V	V	V	V	V	V	V	V	V	V	--	RST CRB 1/8W A 1R PM5 COL A
3622	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB 2512ST A 3R3 PM5 A
3622	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB CFR25S A 1R5 PM5 A
3622	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB CFR25S A 1R2 PM5 A
3622	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB 1/8W A 1R PM5 COL A
3622	V	V	V	V	V	V	V	V	V	V	V	--	RST CRB 1/8W A 2R2 PM5 COL A
3623	V	V	V	V	V	V	V	V	V	V	V	--	RST CRB 1/8W A 18K PM5 COL A
3625	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB 1/8W A 22K PM5 COL A
3625	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB 1/8W A 120R PM5 COL A
3625	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB 1/8W A 220R PM5 COL A
3626	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB 1/8W A 330R PM5 COL A
3626	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB 1/8W A 100R PM5 COL A
3626	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB 1/8W A 220R PM5 COL A
3626	--	--	--	--	--	--	--	--	--	--	--	V	RST CRB 1/8W A 330R PM5 COL A
3627	--	--	--	--	--	--	--	--	--	--	--	V	RST SM 0805 10K PM5 COL B
3627	V	V	V	V	V	V	V	V	V	V	V	--	RST SM 0805 22K PM5 COL B
3630	V	V	V	V	V	V	V	V	V	V	V	--	RST SM 0603 27K PM5 COL
3632	--	--	--	--	--	--	--	--	--	--	--	V	RST SM 0603 33K PM5 COL
3632	V	V	V	V	V	V	V	V	V	V	V	--	RST SM 0603 18K PM5 COL
3632	--	--	--	--	--	--	--	--	--	--	--	V	RST SM 0603 33K PM5 COL
3632	V	V	V	V	V	V	V	V	V	V	V	--	RST SM 0603 39K PM5 COL

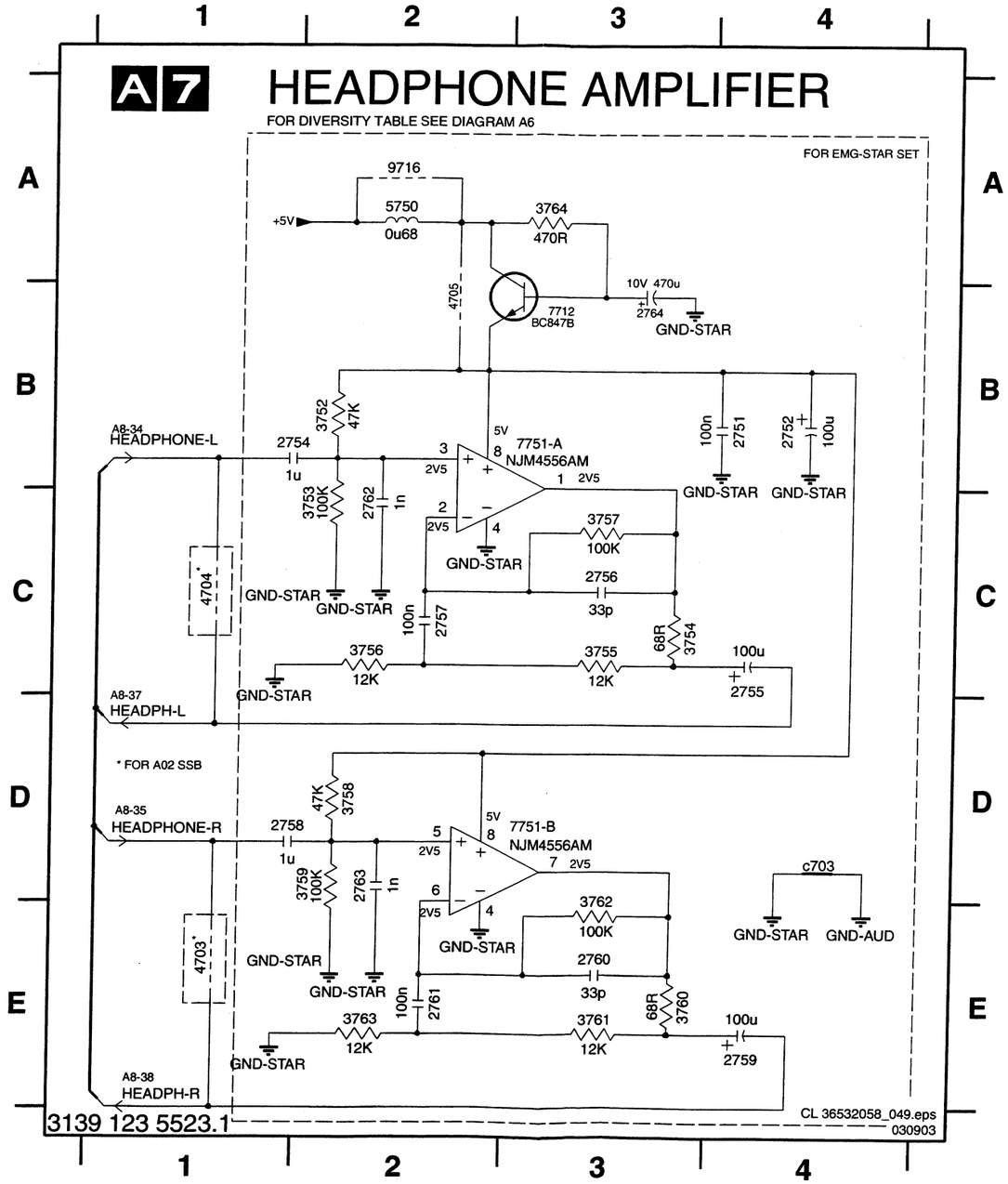
Large Signal Panel: Rotation Circuitry

1601 A2 3649 D1 3683 D1 3686 B1 6080 C2 6083 C4 7681 D2
1620 C4 3681 D2 3684 B2 3687 C3 6081 B3 6084 C1 7682 D3
2601 B2 3682 E2 3685 C1 4601 D3 6082 B2 7680 B2

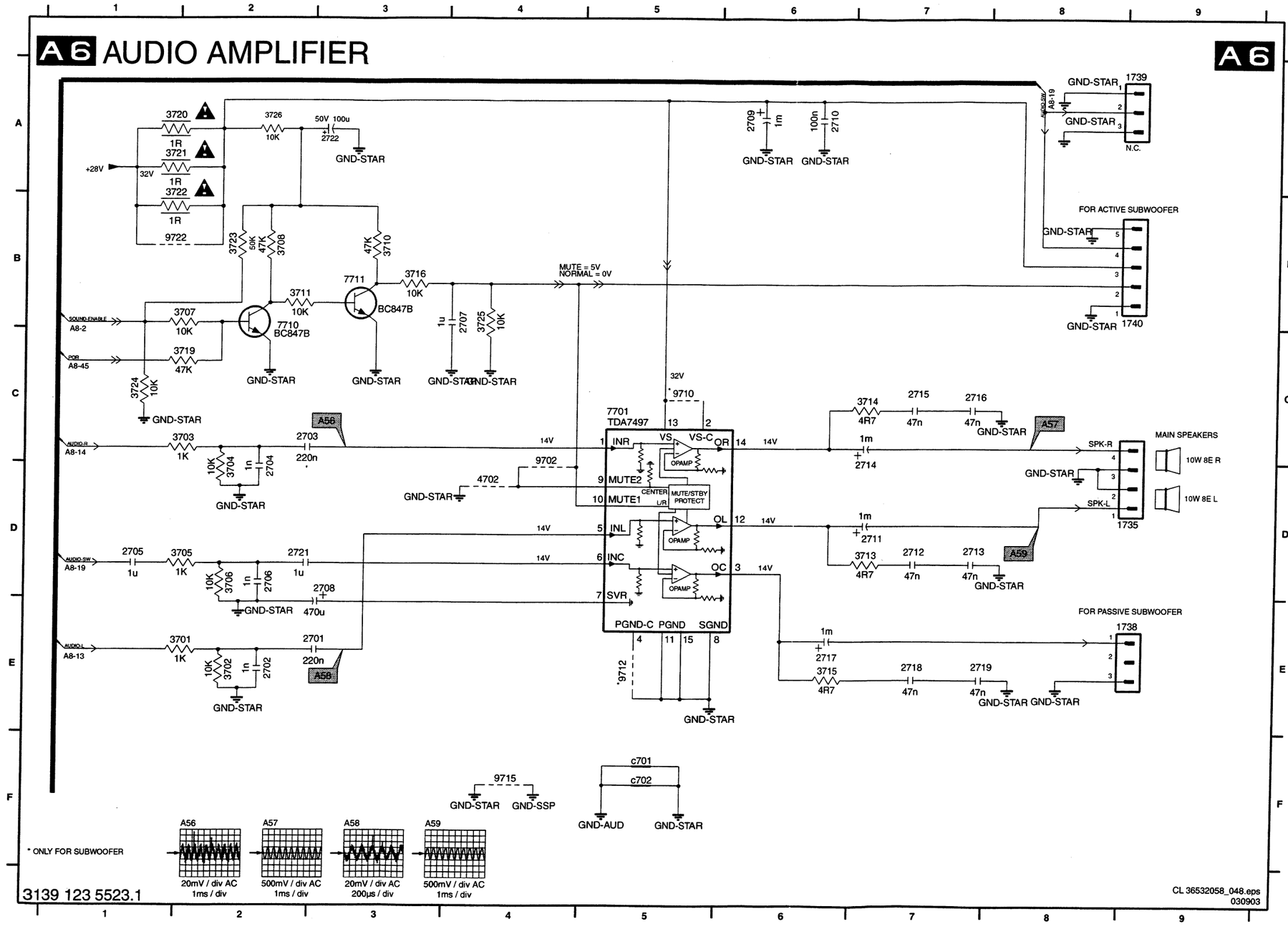


Large Signal Panel: Headphone Amplifier

2751 B4 2756 C3 2760 E3 2764 B3 3755 C3 3759 D2 3763 E2 4705 B2 7751-B D3
2752 B4 2757 C2 2761 E2 3752 B2 3756 C2 3760 E3 3764 A3 5750 A2 9716 A2
2754 B1 2758 D1 2762 C2 3753 C2 3757 C3 3761 E3 4703 E1 7712 B3 c703 D4
2755 C4 2759 E4 2763 D2 3754 C3 3758 D2 3762 E3 4704 C1 7751-A B3



Large Signal Panel: Audio Amplifier



Item	2x10W w/o HP Amp	3x10W w/o HP Amp + Subwoofer	2x10W with EXT Subwoofer	3x10W with HP amp + Subwoofer	2x10W with HP Amp	DESCRIPTION
1738	---	V	---	V	---	CON BM V 3P M 2.50 EH B
1739	---	---	V	---	---	CON BM V 3P M 2.50 EH B
2701	V	---	V	---	V	CER2 0805 Y5V 16V 1U COL R
2701	---	V	---	V	---	CER2 0603 X7R 16V 100N COL
2702	V	V	V	V	V	CER1 0603 NP0 25V 1N COL
2703	V	---	V	---	V	CER2 0805 Y5V 16V 1U COL R
2703	---	V	---	V	---	CER2 0603 X7R 16V 100N COL
2704	V	V	V	V	V	CER1 0603 NP0 25V 1N COL
2705	---	V	---	V	---	CER2 0805 Y5V 16V 1U COL R
2706	---	V	---	V	---	CER2 0603 X7R 50V 3N3 COL
2711	V	---	V	---	V	ELCAP 25V S 1000U PM20 COL B
2711	---	V	---	V	---	ELCAP 25V S 470U PM20 COL B
2714	V	---	V	---	V	ELCAP 25V S 1000U PM20 COL B
2714	---	V	---	---	---	ELCAP 25V S 470U PM20 COL B
2715	V	V	V	V	V	CER2 0603 X7R 16V 47N COL
2716	V	V	V	V	V	CER2 0603 X7R 16V 47N COL
2717	---	V	---	V	---	ELCAP 25V S 1000U PM20 COL B
2718	---	V	---	V	---	CER2 0603 X7R 16V 47N COL
2719	---	V	---	V	---	CER2 0603 X7R 16V 47N COL
2721	---	---	---	V	---	CER2 0603 X7R 10V 220N COL
2721	---	V	---	---	---	CER2 0603 Y5V 10V 470N COL
2751	---	---	---	V	V	CER2 0805 Y5V 50V 100N P8020 R
2752	---	---	---	V	V	ELCAP 25V S 1000U PM20 COL A
2753	---	---	---	V	V	CER2 0805 Y5V 50V 100N P8020 R
2754	---	---	---	V	V	CER2 0805 Y5V 16V 1U COL R
2755	---	---	---	V	V	ELCAP 25V S 1000U PM20 COL A
2756	---	---	---	V	V	CER1 0603 NP0 50V 33P COL
2757	---	---	---	V	V	CER2 0603 X7R 16V 100N COL
2758	---	---	---	V	V	CER2 0805 Y5V 16V 1U COL R
2759	---	---	---	V	V	ELCAP 25V S 100U PM20 COL A
2760	---	---	---	V	V	CER1 0603 NP0 50V 33P COL
2761	---	---	---	V	V	CER2 0603 X7R 16V 100N COL
2762	---	---	---	V	V	CER1 0603 NP0 25V 1N COL
2763	---	---	---	V	V	CER1 0603 NP0 25V 1N COL
2764	---	---	---	V	V	ELCAP 10V S 470U PM20 COL A
3703	V	V	V	V	V	RST SM 0603 10K PM5 COL
3703	---	---	---	---	V	RST SM 0603 18K PM5 COL
3704	V	V	V	---	---	RST SM 0603 22K PM5 COL
3704	---	---	---	---	V	RST SM 0805 10K PM5 COL R
3705	---	V	---	V	---	RST SM 0603 10K PM5 COL
3706	---	---	---	V	---	RST SM 0603 22K PM5 COL
3706	---	---	---	---	V	RST SM 0805 10K PM5 COL R
3706	---	---	---	V	---	RST SM 0805 22K PM5 COL R
3715	---	V	---	V	---	RST SM 0603 RC21 8R2 PM5 R
3722	---	---	---	V	---	RST FUSE NFR25 S 1R PM5 A
3751	---	---	---	V	V	RST SM 0603 22K PM5 COL
3752	---	---	---	V	V	RST SM 0603 47K PM5 COL
3753	---	---	---	V	V	RST SM 0603 47K PM5 COL
3754	---	---	---	V	V	RST CRB CFR25S A 3R9 PM5 A
3755	---	---	---	V	V	RST SM 0603 12K PM5 COL
3756	---	---	---	V	V	RST SM 0603 12K PM5 COL
3757	---	---	---	V	V	RST SM 0603 100K PM5 COL

1735 D8
1738 E8
1739 A8
1740 B8
2701 E3
2702 E2
2703 C2
2704 D2
2705 D1
2706 D2
2707 B4
2708 D3
2709 A6
2710 A6
2711 D7
2712 D7
2713 D7
2714 C7
2715 C7
2716 C7
2717 E6
2718 E7
2719 E7
2721 D2
2722 A3
3701 E2
3702 E2
3703 C2
3704 D2
3705 D2
3706 D2
3707 B2
3708 B2
3710 B3
3711 B2
3713 D7
3714 C7
3715 E6
3716 B3
3719 C2
3720 A1
3721 A1
3722 B1
3723 B2
3724 C1
3725 B4
3726 A2
4702 D4
7701 C5
7710 C2
7711 B3
9702 D4
9710 C5
9712 E5
9715 F4
9722 B1
c701 F5
c702 F5

Large Signal Panel: Tuner SIMM Connector (Female)

A8 TUNER SIM CONNECTOR (FEMALE)

A8

TO 1934 N2 HD JACK PANEL

TO 1933 N2 HD JACK PANEL

TO 1951 OF 3D-COMB FILTER PANEL

TO 0201 OF 2T PIP/DW PANEL

TO 0236 OF 2T PIP DW PANEL

TO 0200 OF 2T PIP DW PANEL

TO/FROM SIDE IO

TO/FROM F CRT

TO/FROM SSB SIM CONN MALE B18

TO 1510 A1 SUPPLY

FROM EXTERNAL FM

COMPAIR CONNECTOR

TUNER

N.C.

RESERVED

A68 500mV / div AC 20µs / div

A69 2 V / div DC 100ms / div

A70 2 V / div DC 100ms / div

components with diversity

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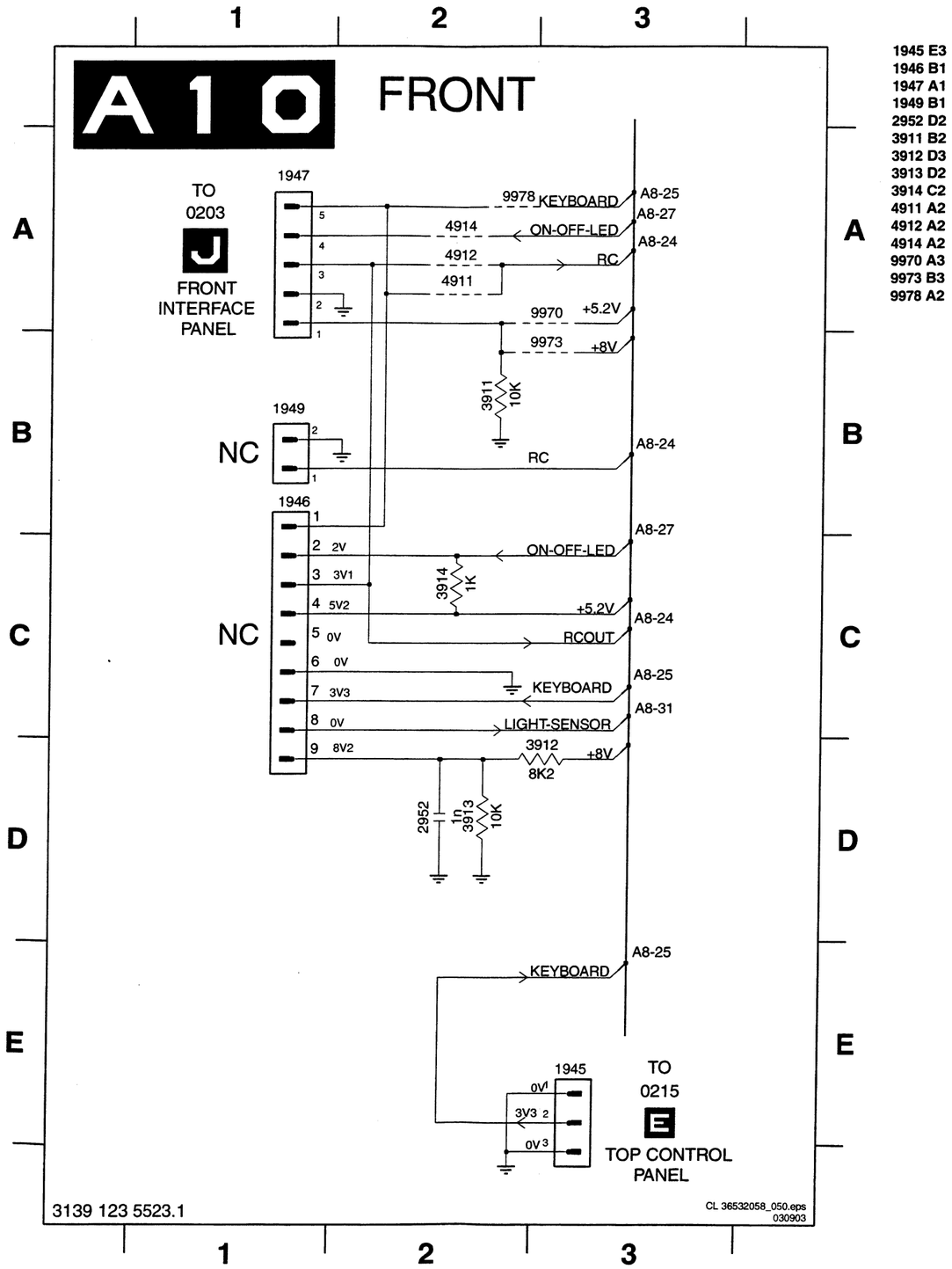
Item	EU CENELEC LL38 9	NA NTSC FYNK 45.75	China IEC PAL 38.9	NA NTSC PHONO 45.75	AP PAL 38.9 mini-PIP	EU CENELEC LL38 9 PIP	DESCRIPTION
1200	---	---	---	---	---	---	TUNER TECH9X700A
1200	---	---	---	---	---	---	TUNER TEDE9-200A
1200	---	---	---	---	---	---	TUNER TECH9-240A
1200	---	---	---	---	---	---	TUNER TEDE9-224B
1200	---	---	---	---	---	---	TUNER UV1317/A1 X-3
1200	---	---	---	---	---	---	TUNER UV1317/A I X-U-3
2203	---	---	---	---	---	---	ELCAP 10V S 100U PM20 COL A
2203	---	---	---	---	---	---	ELCAP 25V S 47U PM20 COL A
3250	---	---	---	---	---	---	RST SM 0805 10K PM5 COL R
3250	---	---	---	---	---	---	RST SM 0805 JUMP 0R05 COL R
3905	---	---	---	---	---	---	RST SM 0603 100R PM5 COL
4202	---	---	---	---	---	---	DIO SIG SM BAS316 COL LR
9925	---	---	---	---	---	---	WR CU-ETP SNPB5-PL 0.58MM COL

Item	SCART I/O + SCI	SCART I/O	SCART I/O-SCI+ PIP	DESCRIPTION
1937	---	---	---	CON BM V 10P M 2.50 EH B
1951	---	---	---	CON BM V 5P M 2.50 EH B
9203	---	---	---	RST SM 0603 JUMP 0R05 COL
9902	---	---	---	WR CU-ETP SNPB5-PL 0.58MM COL

1200 F2	9983 C11
1201 G1	9987 B6
1205 I2	9988 B6
1932 F9	9989 B6
1933 B6	9990 B5
1934 A6	9998 I13
1935 E9	c001 H2
1936 D6	c002 I2
1937 B13	
1940 F6	
1943 E5	
1948 D13	
1951 A13	
1952 E9	
1953 D9	
1955 F5	
1961 C9	
1965 D6	
1966 G9	
1997 E3	
2200 D2	
2201 F1	
2202 G2	
2203 G3	
2455 I7	
2483 B9	
2496 B8	
2914 E2	
2915 E1	
2916 C4	
2917 E12	
2918 F11	
2929 E10	
2930 F8	
2931 D9	
2940 B3	
2941 I8	
2942 I8	
2943 I8	
2944 E12	
2945 H13	
2946 I13	
2947 I7	
2950 G3	
2951 G2	
3200 F3	
3201 F3	
3210 D10	
3211 D10	
3212 D11	
3213 C11	
3250 H3	
3261 E4	
3262 F4	
3427 A7	
3428 A8	
3429 B8	
3430 A9	
3432 A8	
3903 F11	
3904 E1	
3905 I11	
3907 C1	
3910 C1	
3928 C4	
3929 D4	
3930 D3	
3938 F10	
3939 G11	
3940 G11	
3941 E2	
3942 E11	
3943 E11	
3944 C11	
3945 F11	
3999 A3	
4915 I11	
5901 C2	
5902 A1	
5903 A1	
5904 H8	
6200 G2	
6201 G3	
6202 G3	
6402 B9	
6901 A8	
7210 D10	
7211 D11	
7901 C3	
7902 F11	
7908 E11	
7910 B2	
7911 D1	
7912 C1	
9201 C12	
9203 C12	
9205 E8	
9206 D8	
9215 G2	
9225 E8	
9226 D9	
9228 A4	
9229 A4	
9250 E6	
9251 E6	
9292 B4	
9901 C12	
9902 C12	
9903 D12	
9904 C12	
9905 F8	
9906 E3	
9907 C11	
9908 C3	
9909 B1	
9980 B1	
9982 F6	

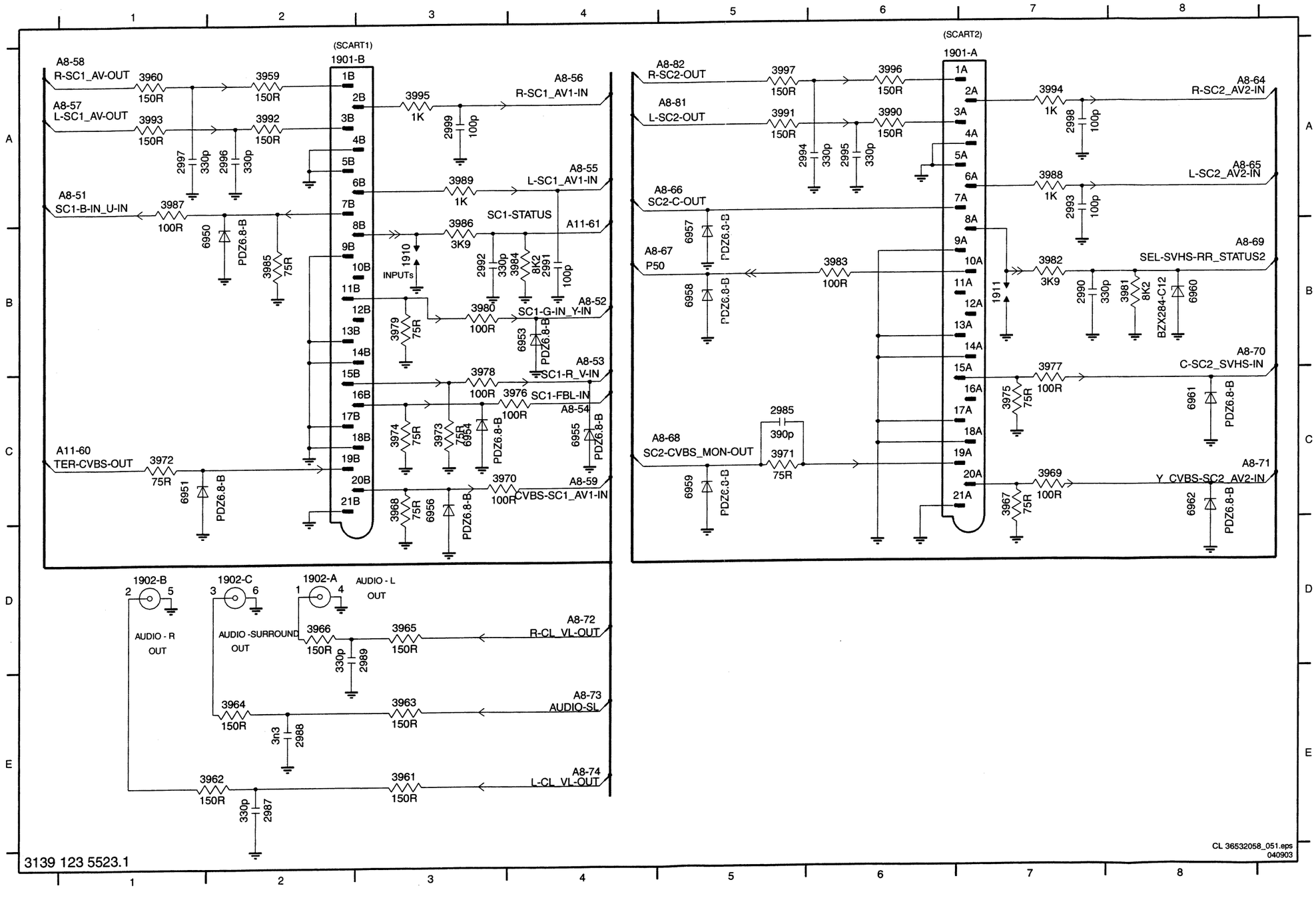
Large Signal Panel: Front



Personal Notes:

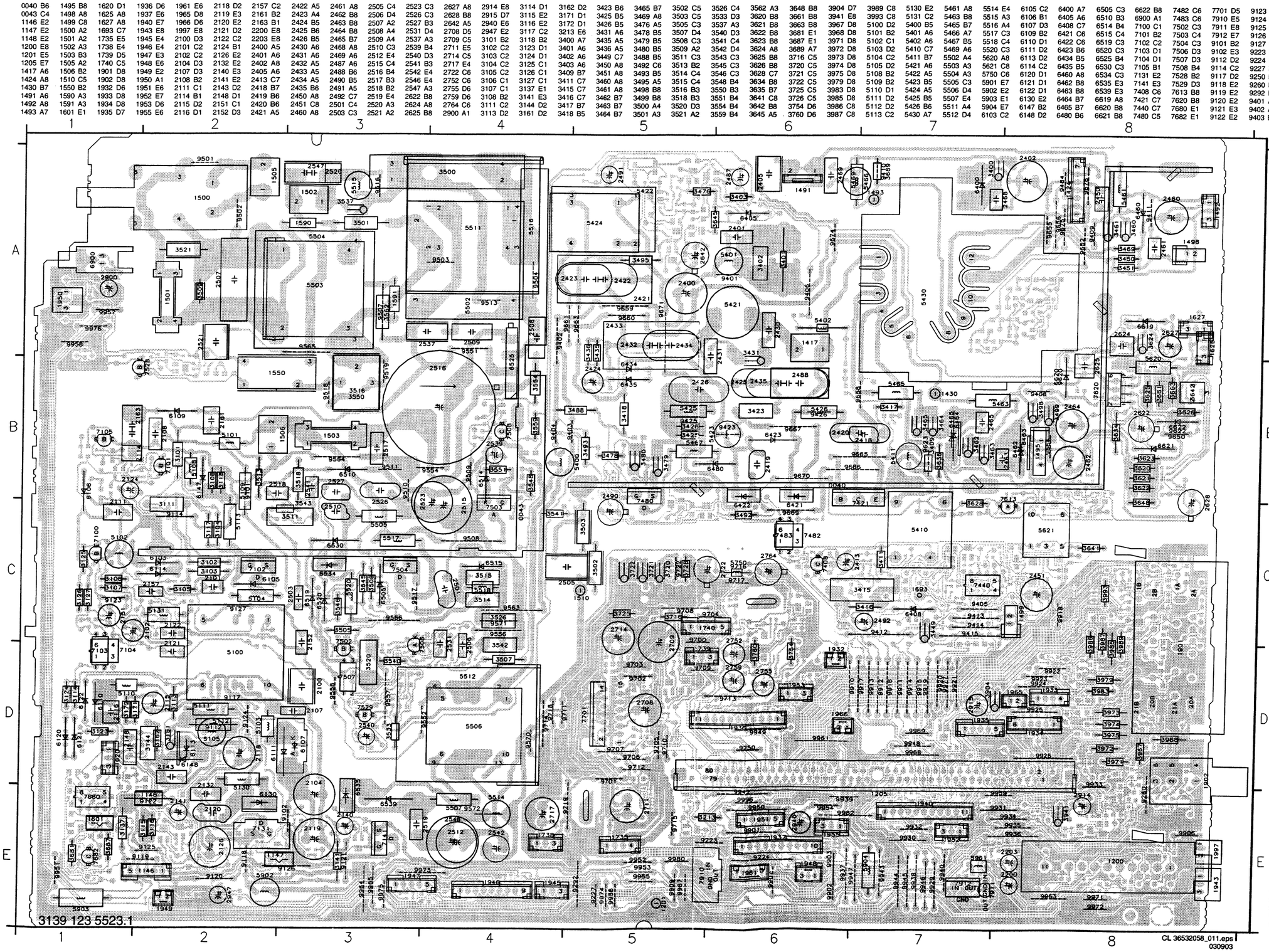
Large Signal Panel: Inputs/Outputs

A11 INPUTS/OUTPUTS



1901-A A6 3982 B7
1901-B A2 3983 B6
1902-A D2 3984 B4
1902-B D1 3985 B2
1902-C D2 3986 B3
1910 B3 3987 A1
1911 B7 3988 A7
2985 C5 3989 A3
2987 E2 3990 A6
2988 E2 3991 A5
2989 D3 3992 A2
2990 B7 3993 A1
2991 B4 3994 A7
2992 B3 3995 A3
2993 A7 3996 A6
2994 A5 3997 A5
2995 A6 6950 B1
2996 A2 6951 C1
2997 A1 6953 B4
2998 A7 6954 C3
2999 A3 6955 C4
3959 A2 6956 C3
3960 A1 6957 B5
3961 E3 6958 B5
3962 E2 6959 C5
3963 E3 6960 B8
3964 E2 6961 C8
3965 D3 6962 C8
3966 D2
3967 C7
3968 C3
3969 C7
3970 C3
3971 C5
3972 C1
3973 C3
3974 C3
3975 C7
3976 C4
3977 C7
3978 C3
3979 B3
3980 B3
3981 B8

Layout LSP (Top Side)



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0040 B6 0043 C4 1146 E2 1147 E2 1148 E2 1200 E8 1201 E5 1205 E7 1417 A6 1424 A8 1430 B7 1491 A6 1492 A8 1493 A7
1495 B8 1498 A8 1499 C8 1500 A2 1501 A2 1502 A3 1503 B3 1505 A2 1506 B2 1510 C5 1550 B2 1590 A3 1591 A3 1601 E1
1620 D1 1625 A8 1627 A8 1633 C7 1735 E5 1738 E4 1739 D5 1740 C5 1901 D8 1902 D8 1932 D6 1933 D8 1934 D8 1935 D7
1936 D6 1937 E6 1940 E7 1943 E8 1945 E4 1946 E4 1947 E3 1948 E6 1949 E2 1950 A1 1951 E6 1952 E7 1953 D6 1955 E6
1961 E6 1965 D8 1966 D6 1997 E8 2100 D3 2101 C2 2102 C2 2104 D3 2107 D3 2108 B2 2111 C1 2114 B1 2115 D2 2116 D1
2118 D2 2119 E3 2120 E2 2121 E2 2122 C2 2124 B1 2126 E2 2131 E3 2132 E2 2140 E3 2141 E2 2143 D2 2148 D1 2151 C1 2152 D3
2157 C2 2161 B2 2163 B1 2200 E8 2400 A5 2401 A6 2402 A8 2405 A6 2413 C7 2418 B7 2419 B6 2420 B6 2421 A5
2422 A5 2423 A4 2424 B5 2425 B6 2426 B5 2430 A6 2431 A6 2432 A5 2433 A5 2434 A5 2435 B6 2450 A8 2451 C8 2460 A8
2461 A8 2462 B8 2463 B8 2464 B8 2465 B7 2468 A8 2469 A6 2487 A6 2488 A5 2490 B5 2491 A5 2492 C7 2501 C4 2503 C3
2505 C4 2506 D4 2507 A2 2508 A4 2509 A4 2510 C3 2512 E4 2515 C4 2516 B4 2517 B3 2518 B2 2519 E4 2520 A3 2521 A2
2523 C3 2526 C3 2527 B3 2531 D4 2537 A3 2539 B4 2540 D3 2541 B3 2542 E4 2547 A3 2622 B8 2624 A8 2625 B8
2627 A8 2628 B8 2642 A5 2708 D5 2709 C5 2711 E5 2714 C5 2722 C6 2752 C6 2755 D6 2759 D6 2764 C6 2900 A1
2914 E8 2915 D7 2940 E6 2947 E2 3100 A2 3101 B2 3102 C2 3103 C2 3104 C2 3105 C2 3106 C1 3107 C1 3108 B2 3111 C2 3113 D2
3114 D1 3115 E2 3116 E2 3117 C2 3118 B2 3123 D1 3124 D1 3125 C1 3126 C1 3127 C1 3137 E1 3141 E3 3144 D2 3161 D2
3162 D2 3171 D1 3172 D1 3213 E6 3400 A7 3401 A6 3402 A6 3403 A6 3409 B7 3411 C7 3415 C7 3416 C7 3417 B7 3418 B5
3423 B6 3425 B5 3426 B5 3431 A6 3435 A5 3436 A5 3449 C7 3450 A8 3451 A8 3460 A8 3462 B7 3463 B7 3464 B7
3465 B7 3469 A8 3476 A5 3478 B5 3479 B5 3480 B5 3488 B5 3492 C6 3493 B5 3495 A5 3498 B8 3499 B8 3500 A4 3501 A3
3502 C5 3503 C5 3507 D4 3508 C3 3509 A2 3511 C3 3513 B2 3514 C4 3515 C4 3516 B3 3518 B3 3520 D3 3521 A2
3526 C4 3533 D3 3537 A3 3540 D3 3541 C4 3542 D4 3543 C3 3545 C3 3546 C3 3548 B4 3550 B3 3551 B4 3554 B4 3559 B4
3562 A3 3620 B8 3621 B8 3622 B8 3624 A8 3625 B8 3626 B8 3628 C7 3634 B8 3635 B7 3641 C8 3642 B8 3645 A5
3648 B8 3661 B8 3663 B8 3681 E1 3687 E1 3689 A7 3716 C5 3720 C5 3721 C5 3722 C5 3725 C5 3726 C5 3754 D6 3760 D6
3904 D7 3941 E8 3967 D8 3968 D8 3971 D8 3972 D8 3973 D8 3974 D8 3975 D8 3979 D8 3983 D8 3985 D8 3986 C8 3987 C8
3989 C8 3993 C8 5100 D2 5101 B2 5102 C1 5103 D2 5104 C2 5105 D2 5106 B2 5108 B2 5109 B2 5110 D1 5111 D2 5112 D2 5113 C2
5130 E2 5131 C2 5400 B5 5401 A6 5402 A6 5410 C7 5411 B7 5421 A6 5422 A5 5423 B5 5424 A5 5425 B5 5426 B6 5430 A7
5461 A8 5463 B8 5465 B7 5466 A7 5467 B5 5469 A6 5502 A4 5503 A3 5504 A3 5505 C3 5506 D4 5507 E4 5511 A4 5512 D4
5514 E4 5515 A3 5516 A4 5517 C3 5518 C4 5520 C3 5521 C8 5620 A8 5621 C8 5622 B8 5623 B8 5624 B8 5625 B8 5626 B8
5750 C6 5901 E7 5902 E2 5903 E1 5904 E7 6103 C2 6105 C2 6107 D1 6111 D2 6113 D2 6114 C2 6120 D1 6121 D1 6122 D1
6434 B5 6435 B5 6463 B8 6464 B7 6465 B7 6480 B6 6539 E3 6619 A8 6620 B8 6621 B8 6622 B8 6623 B8 6624 B8 6625 B8
6626 B8 6627 B8 6628 B8 6629 B8 6630 B8 6631 B8 6632 B8 6633 B8 6634 B8 6635 B8 6636 B8 6637 B8 6638 B8 6639 B8
6105 C2 6107 D3 6110 D1 6111 D2 6113 D2 6114 C2 6120 D1 6121 D1 6122 D1 6130 E2 6147 B2 6148 D2
6400 A7 6405 A6 6408 C7 6421 C6 6422 C6 6423 B6 6434 B5 6435 B5 6460 A8 6462 B8 6463 B8 6464 B7 6465 B7 6480 B6
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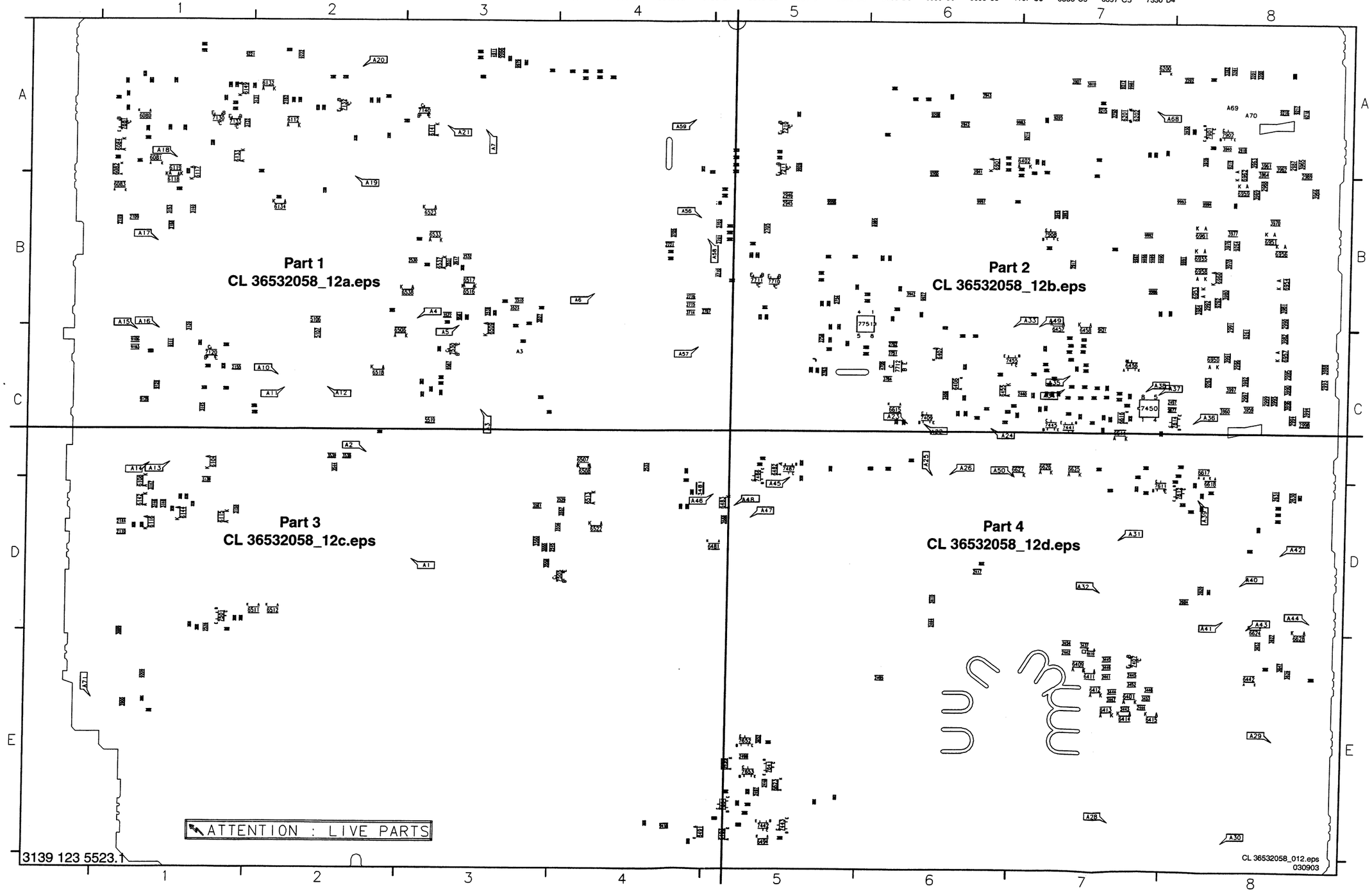
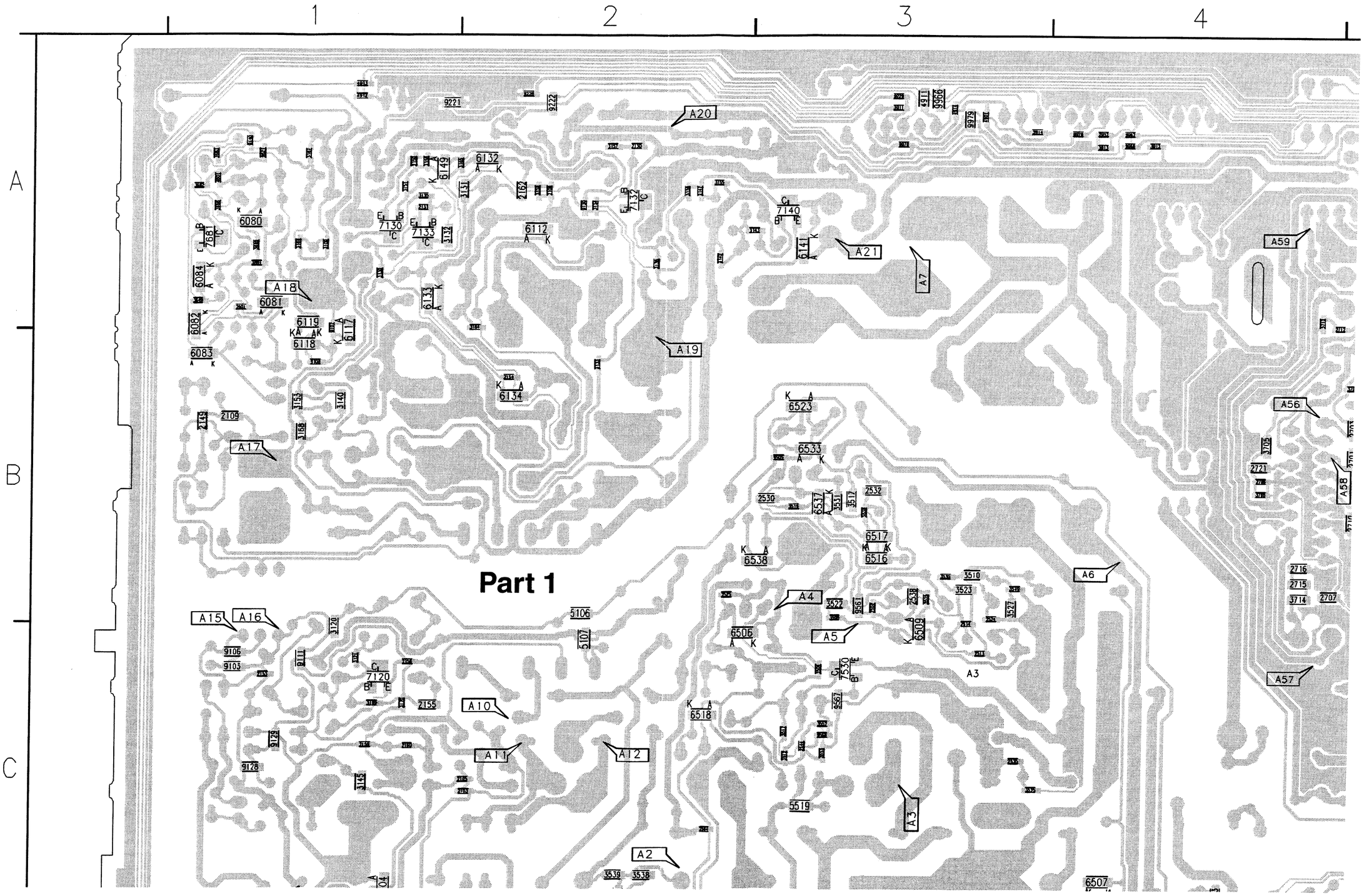
6622 B8 6900 A1 7100 C1 7101 B2 7102 C2 7103 D1 7104 D1 7105 B1 7108 E2 7111 E3 7112 D2 7113 C2
7482 C6 7483 C6 7503 C4 7504 C3 7506 D3 7507 D3 7508 B4 7529 D3 7528 B2 7613 B8 7680 E1 7682 E1
7701 D5 7910 E5 7911 E8 7912 E7 7102 C2 7110 D1 7111 D2 7112 D2 7113 D1 7114 C2 7115 B1 7117 D2 7118 E2 7119 E2 7120 E2 7121 E3 7122 E2
9123 C1 9124 D2 9125 E2 9126 E3 9127 C2 9129 A8 9130 C2 9131 E2 9132 E3 9133 E3 9134 E4 9135 E4 9136 E4 9137 E4 9138 E4 9139 E4 9140 E4 9141 E4 9142 E4 9143 E4 9144 E4 9145 E4 9146 E4 9147 E4 9148 E4 9149 E4 9150 E4 9151 E4 9152 E4 9153 E4 9154 E4 9155 E4 9156 E4 9157 E4 9158 E4 9159 E4 9160 E4 9161 E4 9162 E4 9163 E4 9164 E4 9165 E4 9166 E4 9167 E4 9168 E4 9169 E4 9170 E4 9171 E4 9172 E4 9173 E4 9174 E4 9175 E4 9176 E4 9177 E4 9178 E4 9179 E4 9180 E4 9181 E4 9182 E4 9183 E4 9184 E4 9185 E4 9186 E4 9187 E4 9188 E4 9189 E4 9190 E4 9191 E4 9192 E4 9193 E4 9194 E4 9195 E4 9196 E4 9197 E4 9198 E4 9199 E4 9200 E4 9201 E4 9202 E4 9203 E4 9204 E4 9205 E4 9206 E4 9207 E4 9208 E4 9209 E4 9210 E4 9211 E4 9212 E4 9213 E4 9214 E4 9215 E4 9216 E4 9217 E4 9218 E4 9219 E4 9220 E4 9221 E4 9222 E4 9223 E4 9224 E6 9225 E6 9226 E6 9227 E5 9250 D6 9260 E8 9292 E5 9401 A6 9402 A4 9403 B4
9404 B4 9405 C7 9406 A6 9408 B8 9409 A8 9410 A7 9411 A8 9412 C7 9413 C7 9414 C7 9415 C7 9423 B6 9425 B5 9426 B6 9484 A8 9501 A2 9502 A2 9503 A4 9504 A4 9507 A3 9508 C4 9509 B4 9510 B3 9511 B3 9513 A4 9516 A3 9517 C3 9518 B3 9519 B3 9551 A4 9552 D4 9554 B4 9556 C4 9557 D3 9558 D3 9563 C4 9564 B3 9565 A3 9566 C3 9570 D4 9571 C4 9572 E4 9620 B8 9622 B8 9623 B7 9650 B8 9652 A8 9655 A8 9656 A8 9658 B7 9659 A5 9660 A5 9661 A4 9663 A5 9664 B8 9665 B7 9666 B6 9667 B6 9669 C6 9670 B6 9671 A5 9674 A6 9675 A8 9678 A8 9700 C5 9701 D5 9702 D5 9703 D5 9704 C6 9705 D5 9706 D5 9707 D5 9708 C5 9709 D5 9710 D5 9711 D4 9712 D5 9713 D6 9714 D4 9715 E5 9716 C6 9717 C6 9718 D4 9719 E5 9722 C6 9901 E6 9902 E6 9903 E6 9906 E8 9907 E6 9909 E5 9910 D6 9911 D7 9912 D7 9913 D7 9914 D7 9915 D7 9916 D7 9917 D7 9918 C8 9919 D7 9920 D7 9921 D7 9922 D8 9923 D8 9924 D8 9925 D8 9926 D8 9929 E7 9930 E7 9931 E8 9932 E7 9933 D8
9934 E8 9935 E8 9936 E8 9937 E6 9938 E7 9939 E6 9940 E7 9942 E6 9943 E7 9944 E7 9945 E7 9946 E7 9947 E7 9948 D7 9949 D6 9950 E6 9951 E1 9952 E5 9953 E5 9954 E6 9955 E5 9956 E5 9957 A1 9958 A1 9959 E8 9961 D6 9963 E8 9964 E3 9965 E3 9967 E5 9968 D7 9969 D7 9971 E8 9972 E8 9973 E4 9974 E5 9975 E3 9976 A1 9977 D7 9980 E5 9982 E6 9996 E6

Layout LSP (Overview Bottom Side)

0201 B5	1902 D7	1915 D6	1928 D5	1938 D4	1955 D3	1965 D2	1975 D2	2008 B7	2030 A6	2068 B7	2083 B7	2318 C4	2362 C3	2397 C5	3009 A7	3154 B7	3316 C4	3331 C4	3360 C3	3372 D3	3386 C4	3509 C5	4152 C7	6361 C2	6398 C5	7356 C5
0202 B5	1903 D7	1918 D6	1929 D5	1939 D4	1956 D3	1966 D2	1976 D2	2012 B5	2037 A5	2069 C7	2084 B7	2319 C4	2363 C3	2932 C5	3022 A5	3155 A7	3317 C4	3332 C4	3361 C3	3373 C3	3391 C5	3510 C5	4361 D3	6365 C3	7100 B6	7361 C2
0290 C2	1904 D6	1919 D6	1931 D5	1941 D4	1958 D3	1967 D2	1977 D2	2013 B6	2041 A7	2070 B7	2085 B7	2321 D4	2364 C3	2933 C5	3064 C7	3307 C3	3319 D4	3333 C4	3362 D3	3376 C3	3392 C5	3936 D6	4363 C2	6367 C3	7300 B3	7365 D3
0291 B2	1906 D6	1920 D5	1932 D5	1948 D3	1959 D3	1968 D2	1978 D2	2018 B6	2042 A7	2071 B7	2086 B7	2327 C4	2365 C3	2935 D5	3065 B7	3308 C4	3320 D4	3338 C4	3363 C3	3377 D3	3393 C5	3939 D6	4501 A2	6368 C3	7301 C3	7382 C4
1112 B5	1907 D6	1921 D5	1933 D5	1949 D3	1960 D3	1969 D2	1979 D1	2019 B5	2063 C7	2072 A7	2087 B7	2328 C4	2366 D3	2936 D5	3071 C7	3309 D3	3321 C4	3339 C4	3364 C3	3378 D3	3394 C5	4101 C6	5129 B5	6381 C5	7302 C4	7383 C5
1114 C6	1909 D6	1923 D5	1934 D5	1950 D3	1961 D3	1970 D2	1980 D1	2024 B6	2064 C7	2073 A7	2307 C3	2329 C4	2380 C5	3003 B5	3072 A7	3310 D4	3322 C4	3345 C6	3365 D3	3380 C5	3395 C5	4102 C6	5307 C4	6382 D5	7303 C4	7393 C5
1115 A7	1910 D6	1924 D5	1935 D5	1951 D3	1962 D3	1972 D2	2003 A5	2025 B5	2065 B7	2074 A7	2308 C4	2331 D4	2384 C5	3005 B5	3073 A7	3311 C3	3323 C4	3353 C5	3366 D3	3382 C4	3396 C5	4103 C6	5317 C4	6384 C5	7310 D3	7730 A2
1117 B7	1911 D6	1925 D5	1936 D4	1952 D3	1963 D2	1973 D2	2005 A6	2027 B6	2066 B7	2075 A7	2311 C4	2339 C4	2386 C4	3007 A5	3074 A7	3312 C3	3329 D4	3354 C5	3367 C3	3384 C5	3397 C5	4104 C6	5327 C4	6385 C4	7320 D4	7790 C2
1901 D7	1913 D6	1926 D5	1937 D4	1953 D3	1964 D2	1974 D2	2007 C7	2028 B5	2067 B7	2076 A7	2317 C4	2361 C3	2395 C5	3008 A7	3153 B7	3313 C3	3330 D4	3356 D5	3368 D3	3385 C5	3398 C5	4107 C6	6353 C5	6397 C5	7330 D4	



Layout LSP (Part 1 Bottom Side)



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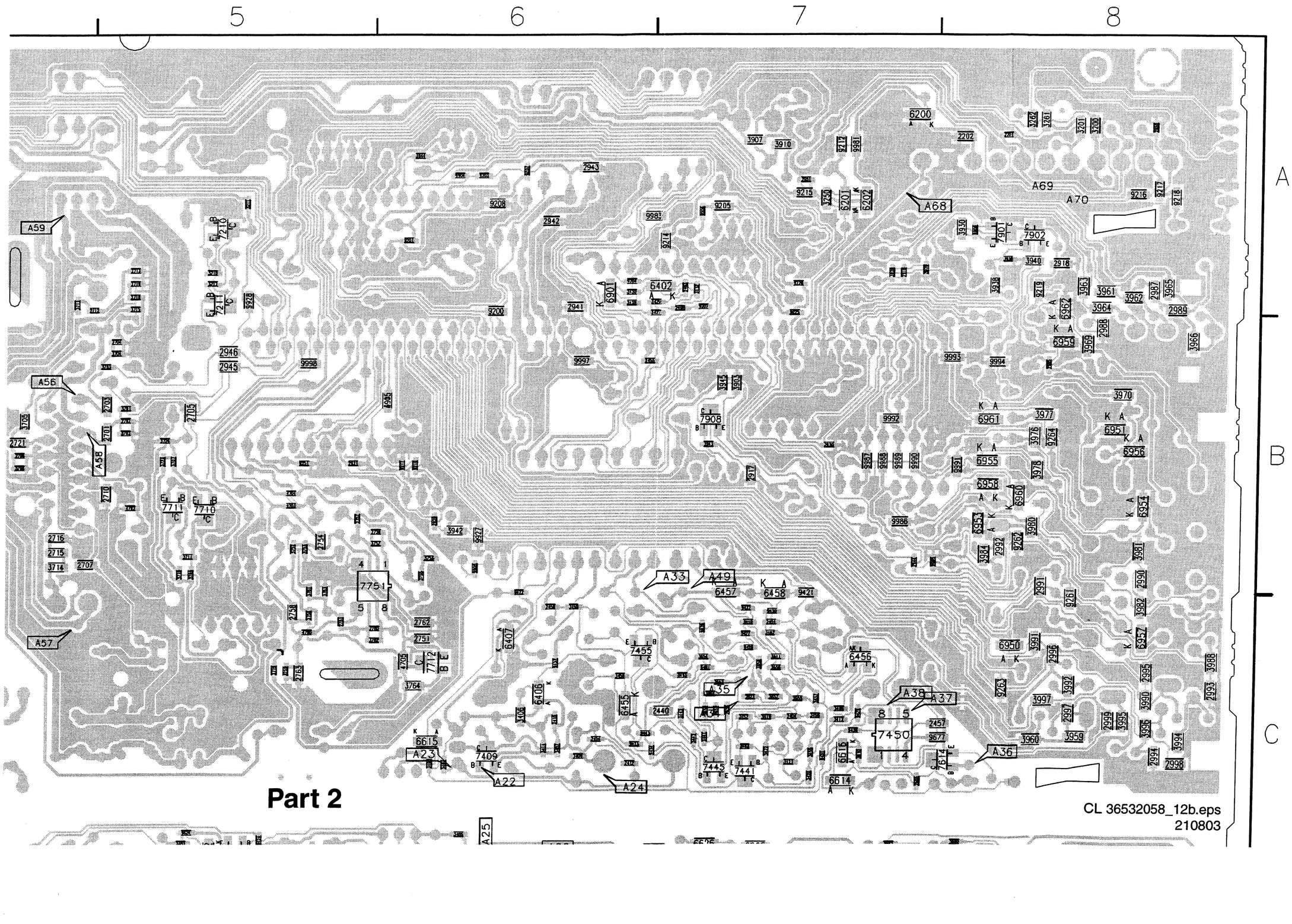
210803

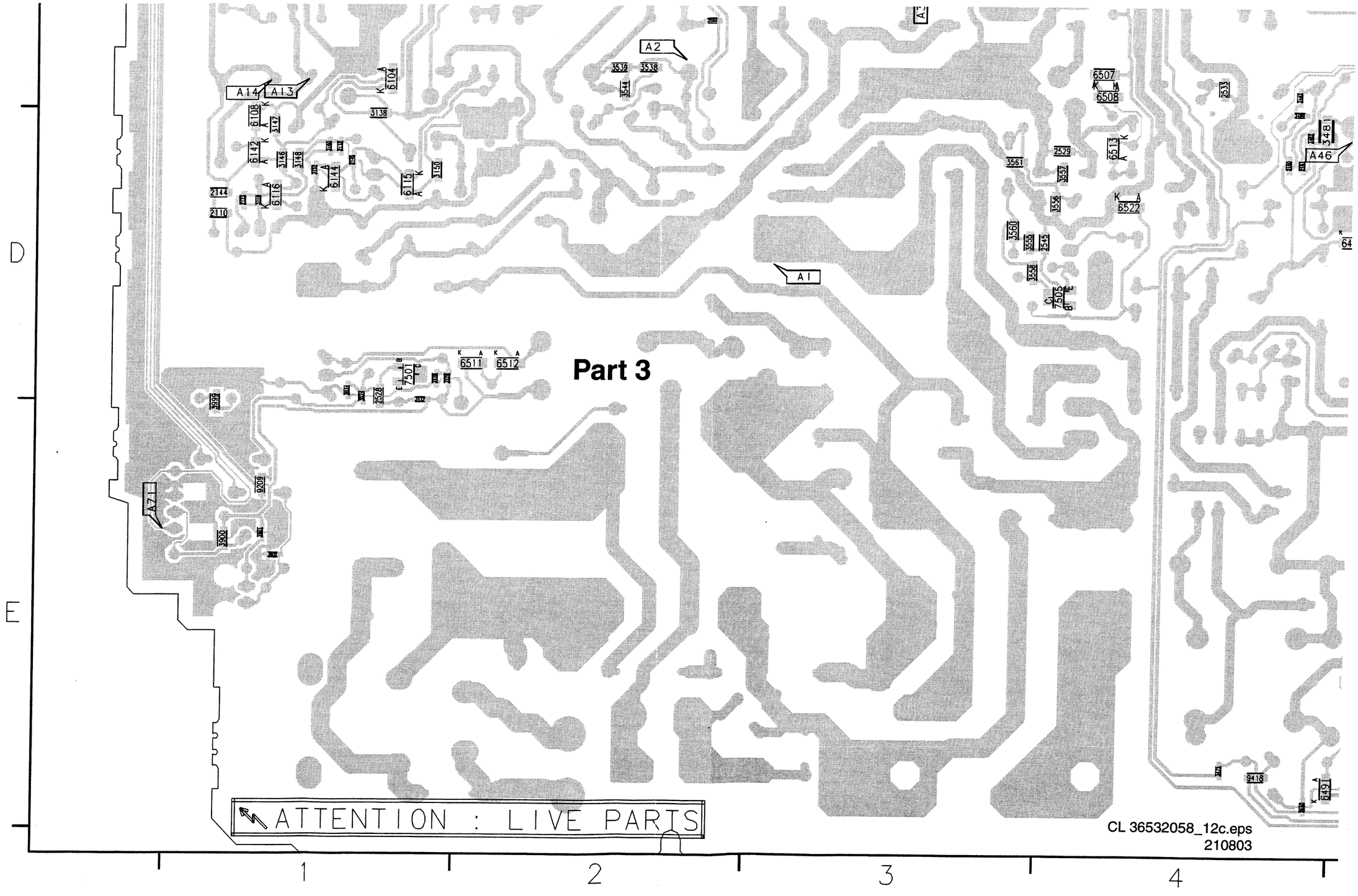
Layout LSP (Part 2 Bottom Side)



Part 2

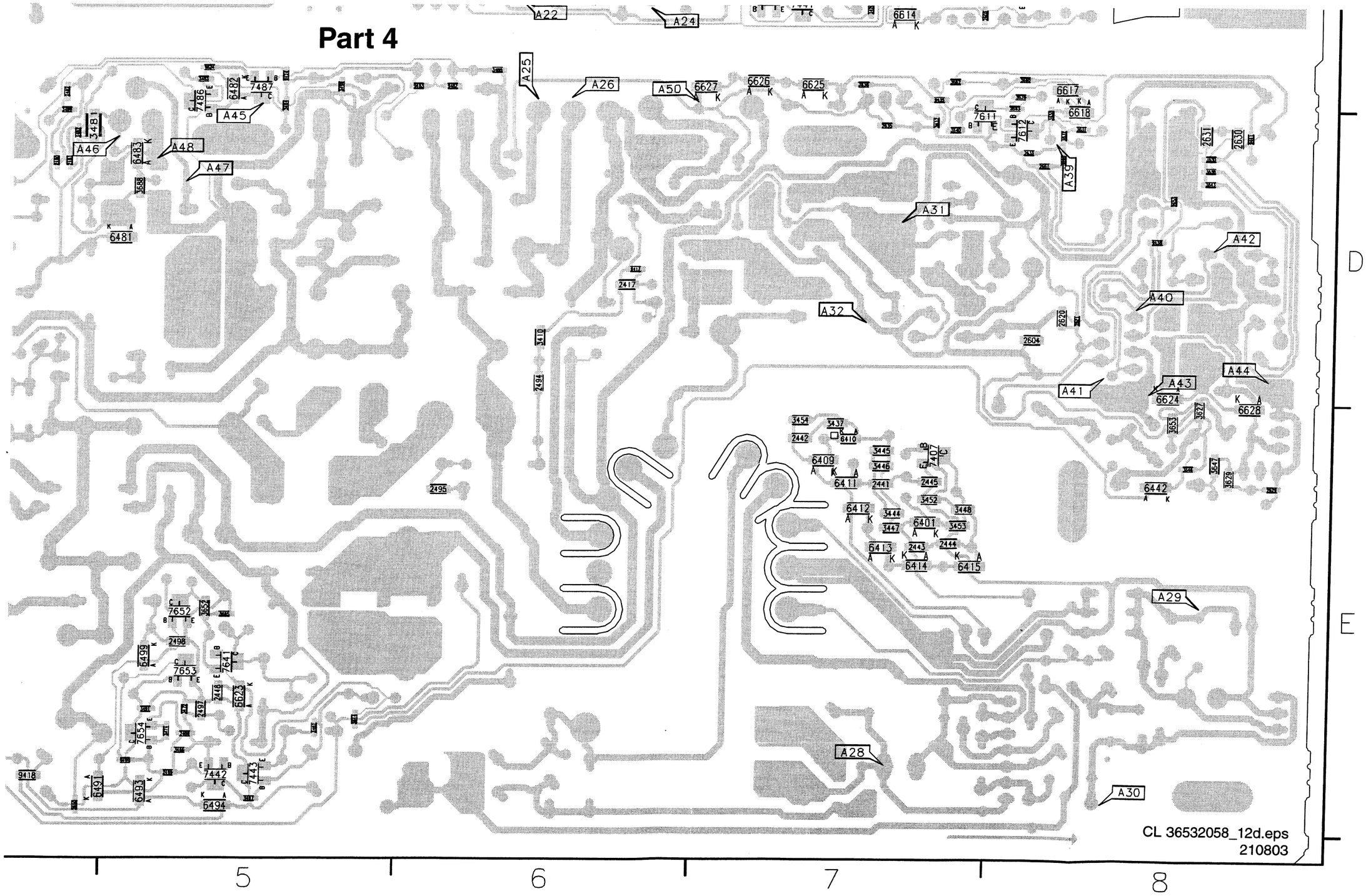
CL 36532058_12b.eps
210803

Layout LSP (Part 3 Bottom Side)



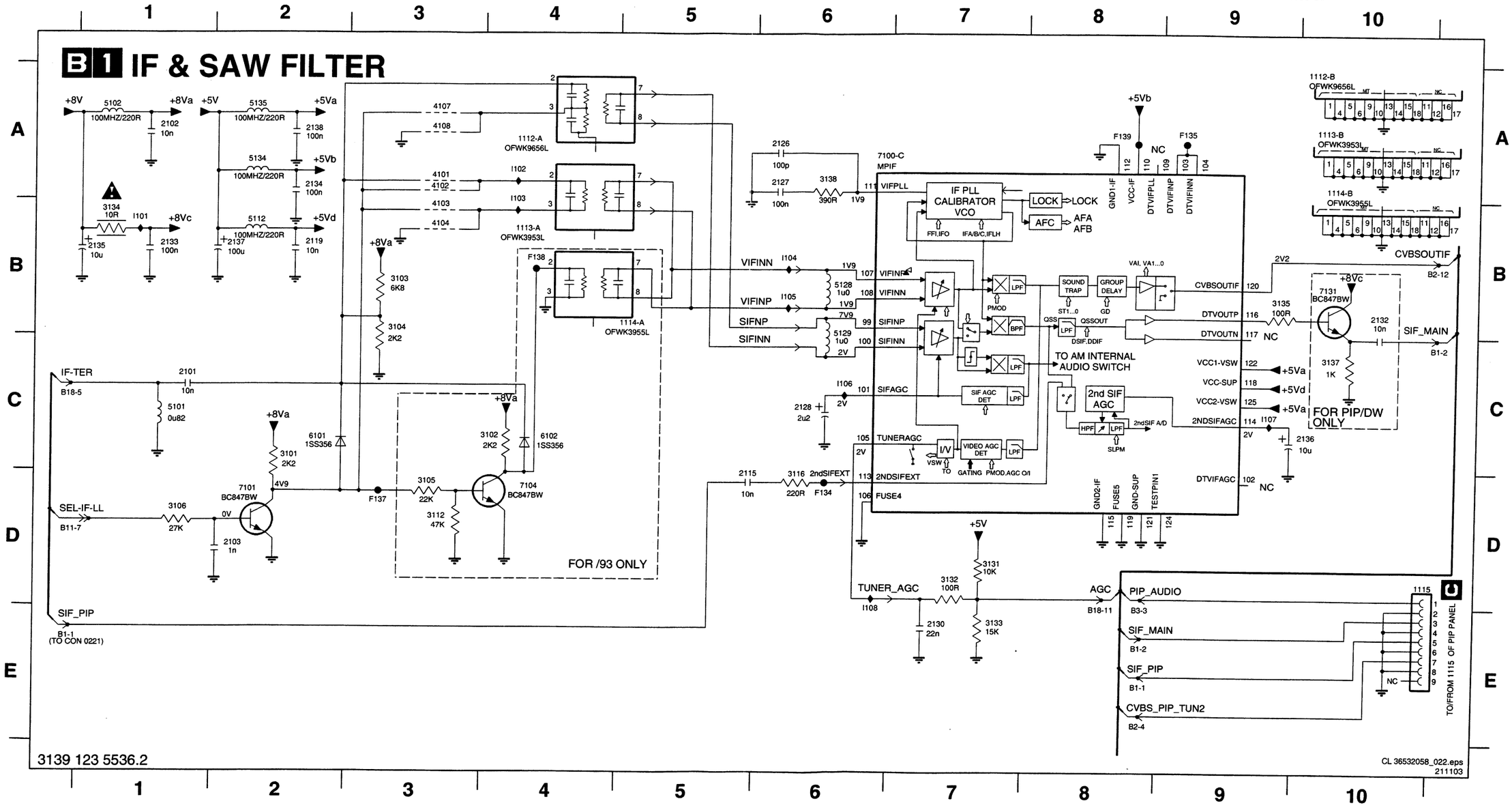
CL 36532058_12c.eps
210803

Layout LSP (Part 4 Bottom Side)



Small Signal Board: If & SAW Filter

1112-A A4	1114-A B5	2102 A1	2126 A6	2132 B10	2136 C10	3102 C4	3106 D1	3132 D7	3137 C10	4103 B3	5101 C1	5129 B6	6102 C4	7131 B10	F132 E10	F138 B4	I103 A4	I107 C9
1112-B A10	1114-B A10	2103 D2	2127 A6	2133 B1	2137 B2	3103 B3	3112 D3	3133 E7	3138 A6	4104 B3	5102 A1	5134 A2	7100-C A6	F114 E10	F134 D6	F139 A8	I104 B6	I108 E6
1113-A B4	1115 D10	2115 D5	2128 C6	2134 A2	2138 A2	3104 B3	3116 D6	3134 B1	4101 A3	4107 A3	5112 B2	5135 A2	7101 D2	F115 D10	F135 A9	I101 B1	I105 B6	
1113-B A10	2101 C1	2119 B2	2130 E7	2135 B1	3101 C2	3105 D3	3131 D7	3135 B9	4102 A3	4108 A3	5128 B6	6101 C2	7104 D4	F116 E10	F137 D3	I102 A4	I106 C6	

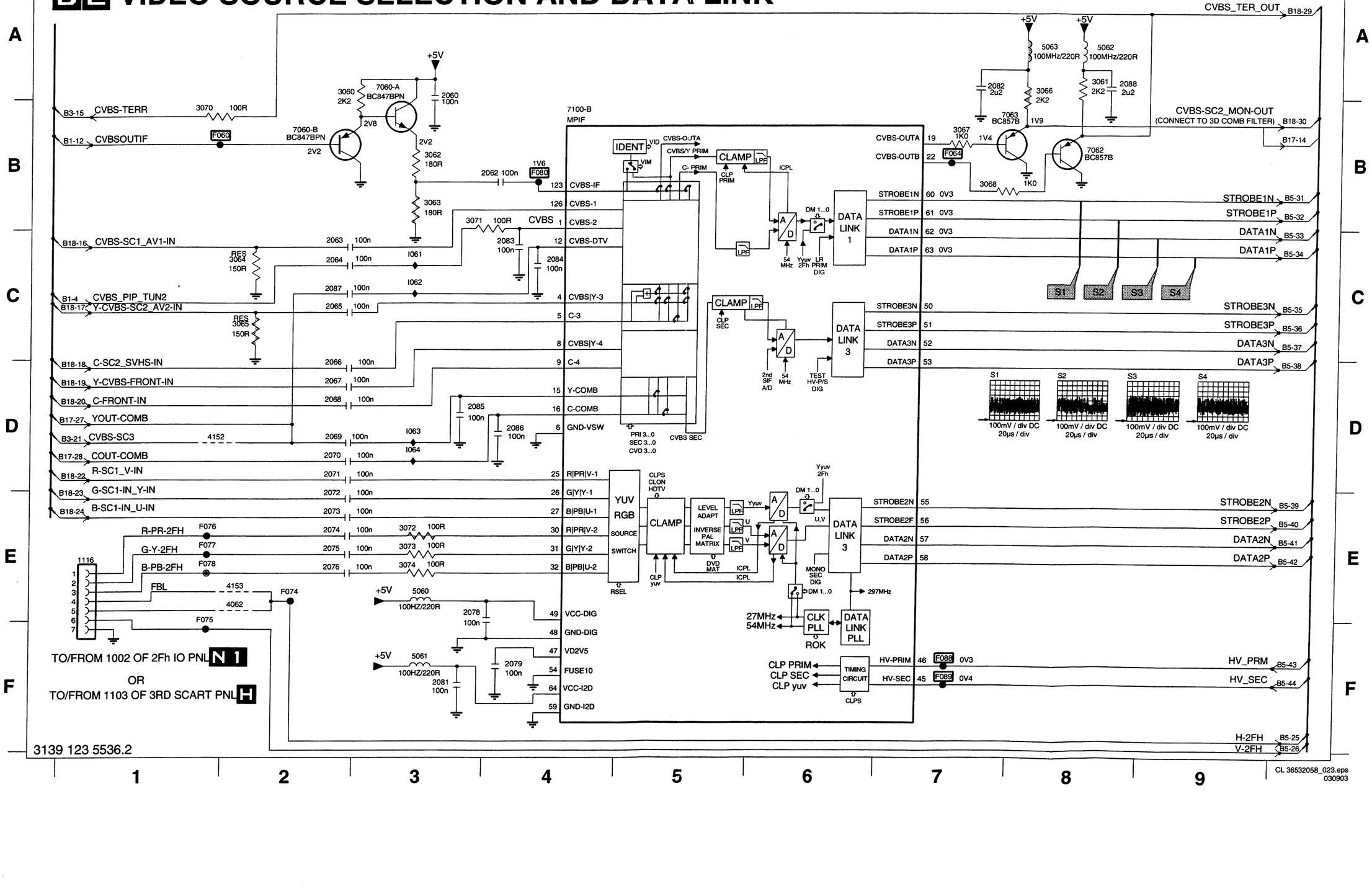


Small Signal Board: Video Source Selection & Data Link

1116 E1	2064 C2	2068 D2	2072 E2	2076 E2	2082 A7	2086 D4	3061 A8	3065 C2	3070 B1	3074 E3	5060 E3	7060-B B2	F060 B1	F076 E1	F088 F7	I063 D3
2060 A3	2065 C2	2069 D2	2073 E2	2078 E3	2083 C4	2087 C2	3062 B3	3066 A8	3071 B3	4062 E2	5061 F3	7062 B8	F064 B7	F077 E1	F089 F7	I064 D3
2062 B4	2066 D2	2070 D2	2074 E2	2079 F4	2084 C4	2088 A8	3063 B3	3067 B7	3072 E3	4152 D1	5063 A8	7063 B7	F074 E2	F078 E1	I061 C3	
2063 C2	2067 D2	2071 D2	2075 E2	2081 F3	2085 D3	3060 A2	3064 C2	3068 B7	3073 E3	4153 E2	7060-A A3	7100-B B4	F075 F1	F080 B4	I062 C3	

1 2 3 4 5 6 7 8 9

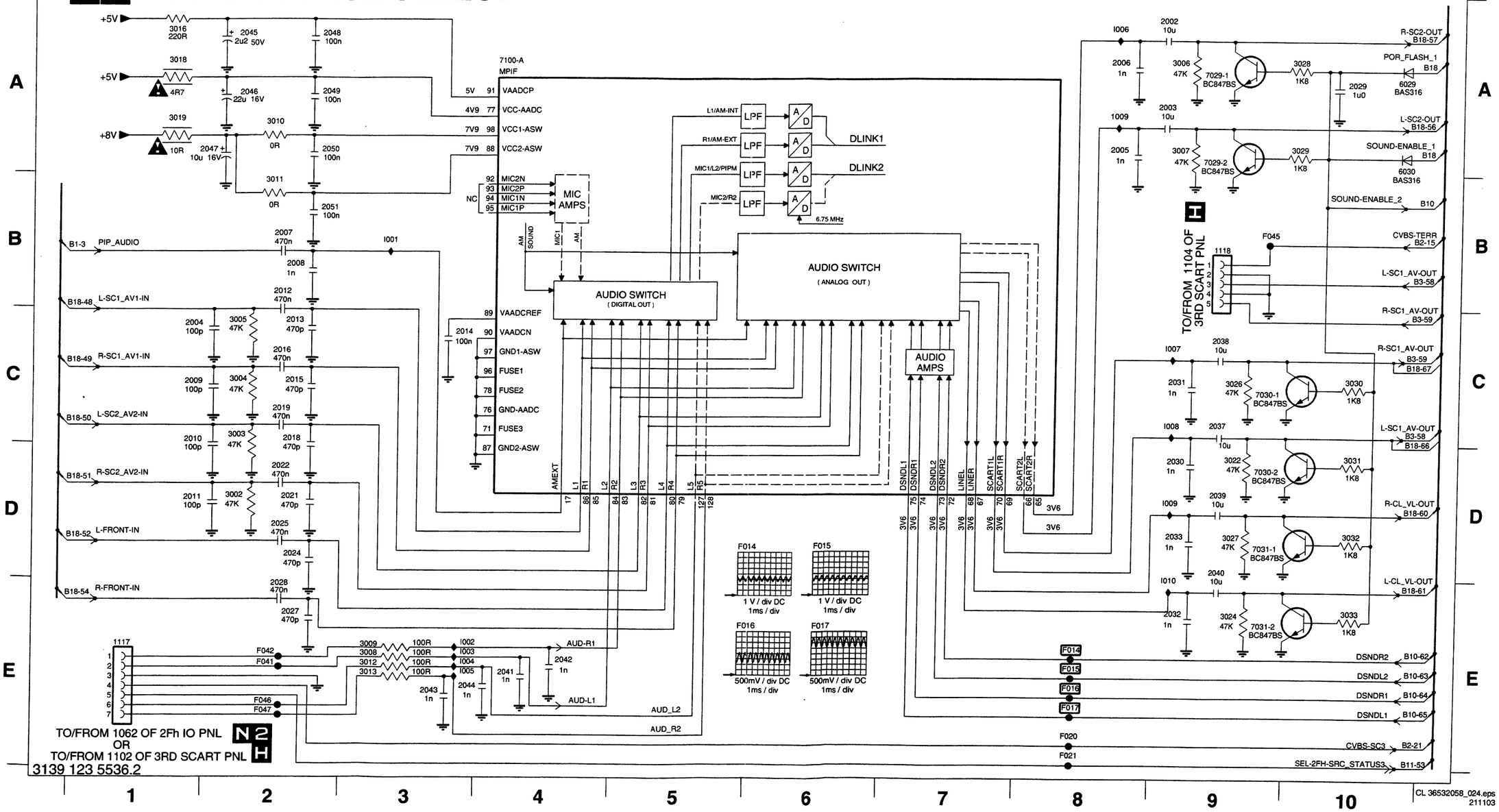
B2 VIDEO SOURCE SELECTION AND DATA LINK



Small Signal Board: Audio Source Select

1	2	3	4	5	6	7	8	9	10
1009 A8	2005 A8	2011 D1	2018 C2	2027 E2	2033 D9	2042 E4	2048 A2	3004 C2	3010 A2	3019 A1	3029 A10	6030 A10	7031-2 E9	F020 E8	F047 E2	I006 A8
1117 E1	2006 A8	2012 B2	2019 C2	2028 E2	2037 C9	2043 E3	2049 A2	3005 C2	3011 B2	3022 D9	3030 C10	7029-1 A9	7100-A A4	F021 E8	I001 B3	I007 C9
1118 B9	2007 B2	2013 C2	2021 D2	2029 A10	2038 C9	2044 E3	2050 A2	3006 A9	3012 E3	3024 E9	3031 D10	7029-2 A9	F014 E8	F041 E2	I002 E3	I008 C9
2002 A9	2008 B2	2014 C3	2022 D2	2030 D9	2039 D9	2045 A2	2051 B2	3007 A9	3013 E3	3026 C9	3032 D10	7030-1 C9	F015 E8	F042 E2	I003 E3	I009 D9
2003 A9	2009 C1	2015 C2	2024 D2	2031 C9	2040 D9	2046 A2	3002 D2	3008 E3	3016 A1	3027 D9	3033 E10	7030-2 D9	F016 E8	F045 B10	I004 E3	I010 D9
2004 C1	2010 C1	2016 C2	2025 D2	2032 E9	2041 E4	2047 A2	3003 C2	3009 E3	3018 A1	3028 A10	6029 A10	7031-1 D9	F017 E8	F046 E2	I005 E3	

B3 AUDIO SOURCE SELECT



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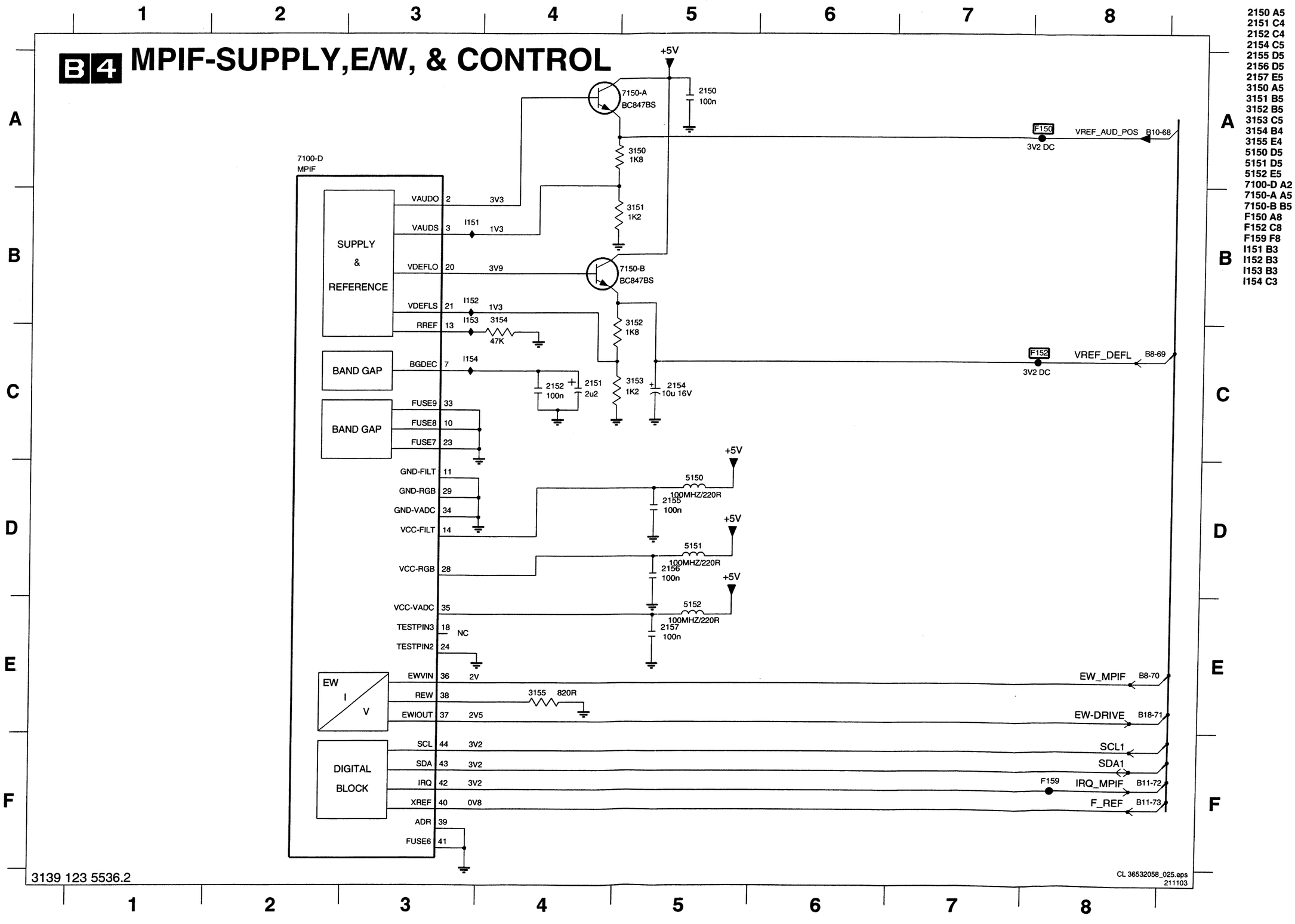
211103

Small Signal Board: MPIF-Supply, E/W, & Control

B4 MPIF-SUPPLY,E/W, & CONTROL

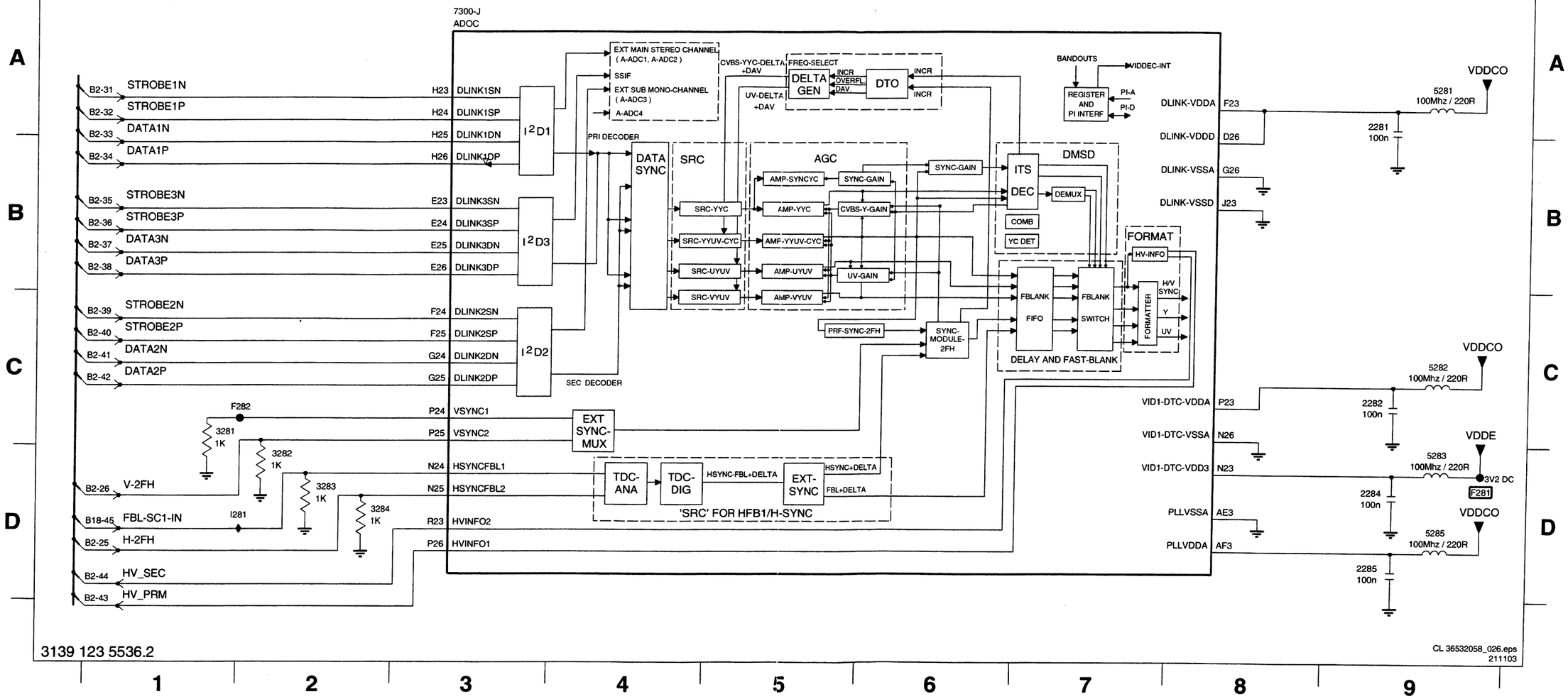


2150 A5
2151 C4
2152 C4
2154 C5
2155 D5
2156 D5
2157 E5
3150 A5
3151 B5
3152 B5
3153 C5
3154 B4
3155 E4
5150 D5
5151 D5
5152 E5
7100-D A2
7150-A A5
7150-B B5
F150 A8
F152 C8
F159 F8
I151 B3
I152 B3
I153 B3
I154 C3

Small Signal Board: Video Decoder

2281 A9 | 2282 C9 | 2284 D9 | 2285 D9 | 3281 C1 | 3282 D2 | 3283 D2 | 3284 D2 | 5281 A9 | 5282 C9 | 5283 D9 | 5285 D9 | 7300-J A3 | F281 D9 | F282 C2 | I281 D2

B5 VIDEO DECODER



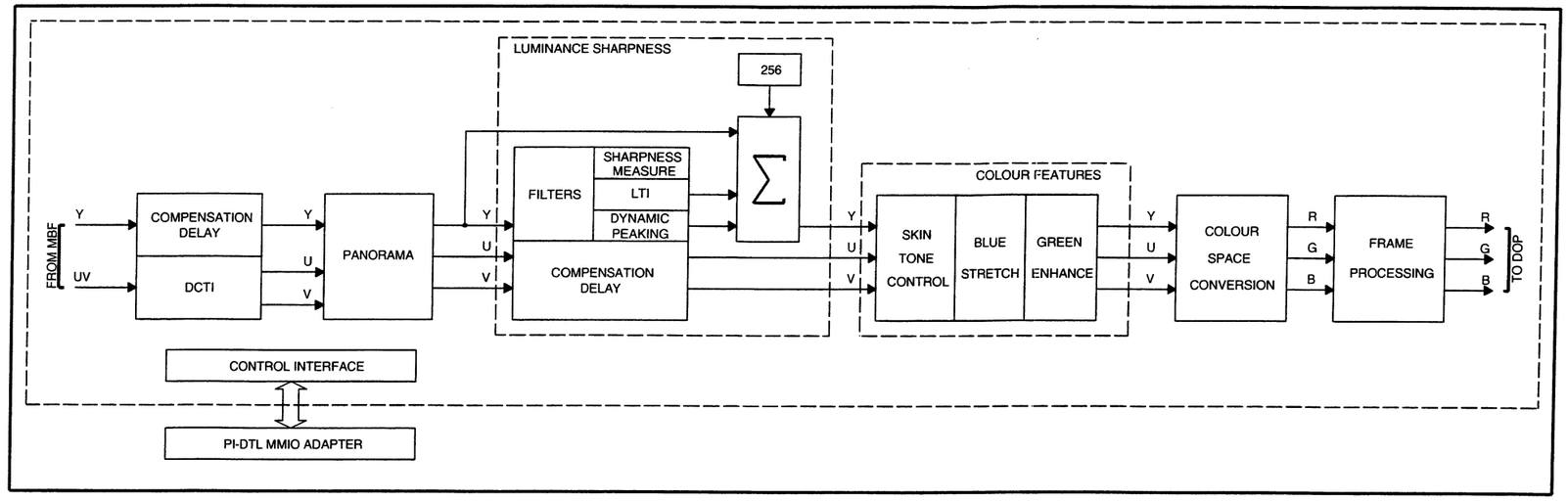
3139 123 5536.2

CL 36532058_026.eps 211103

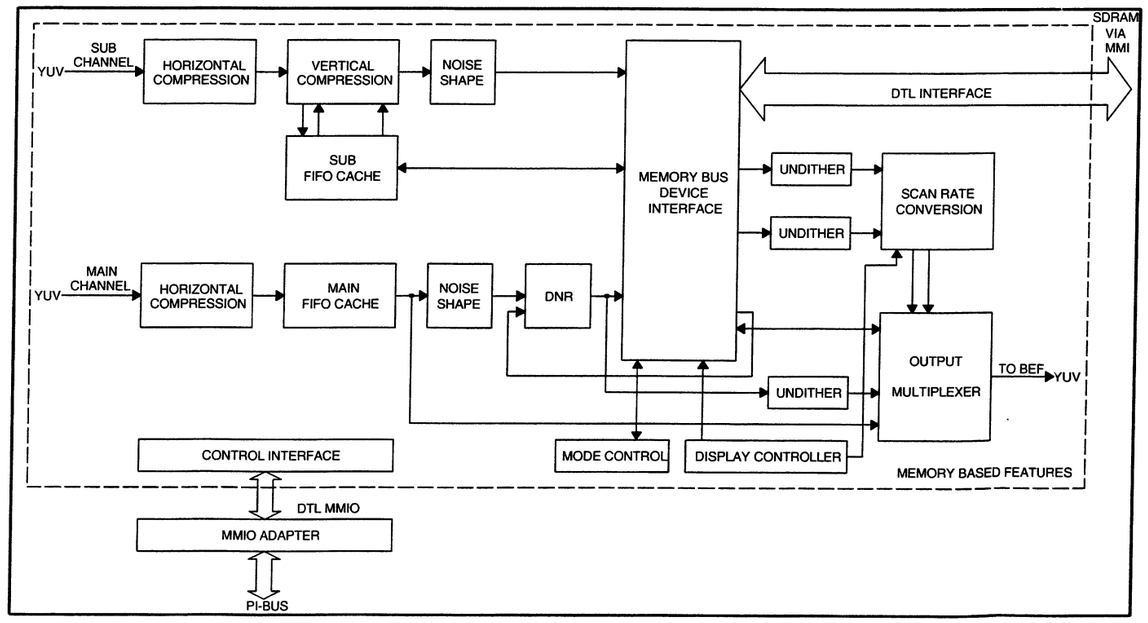
Small Signal Board: Feature Box

B6 FEATURE BOX

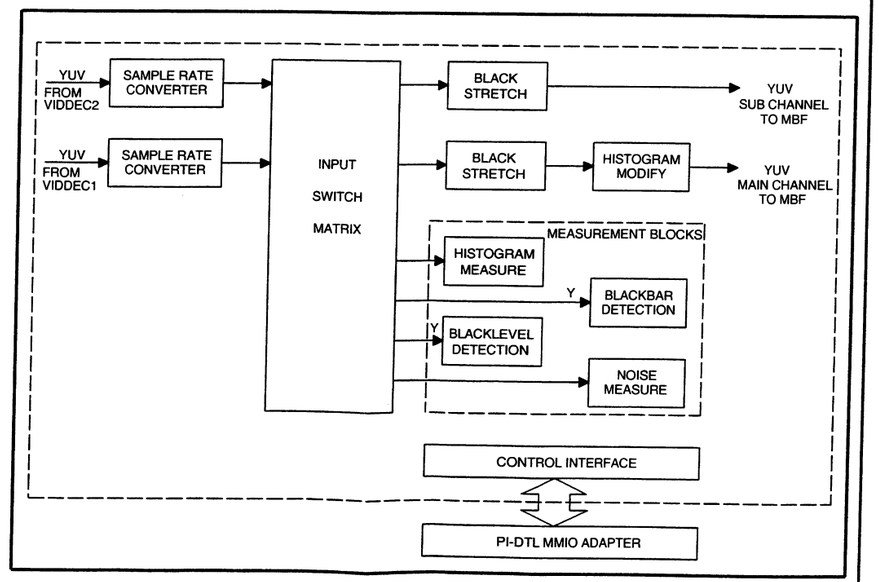
7300
BACK END PROCESSING



7300
MEMORY BASED PROCESSING



7300
FRONT END PROCESSING



3139 123 5536.2

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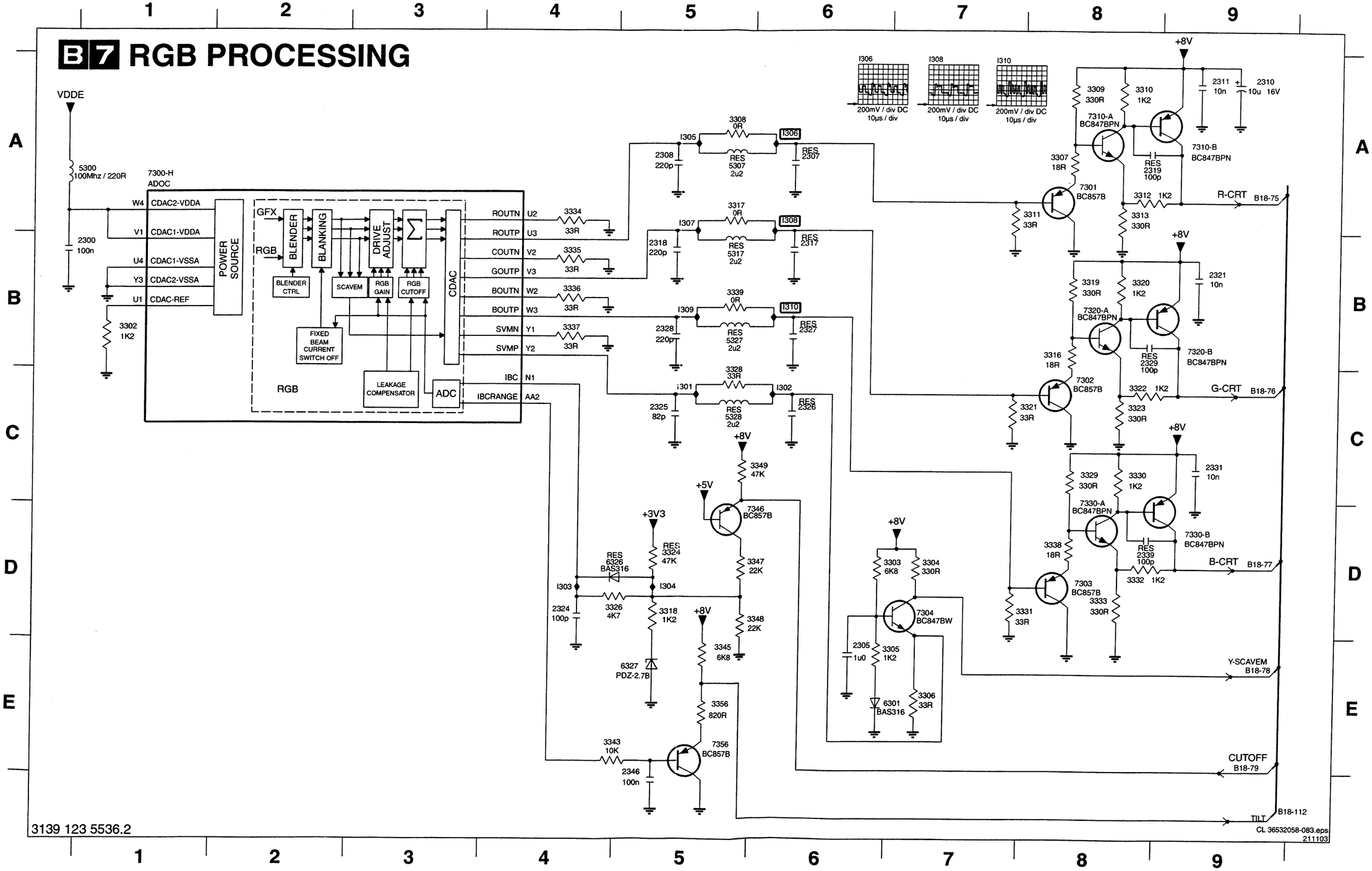
020903

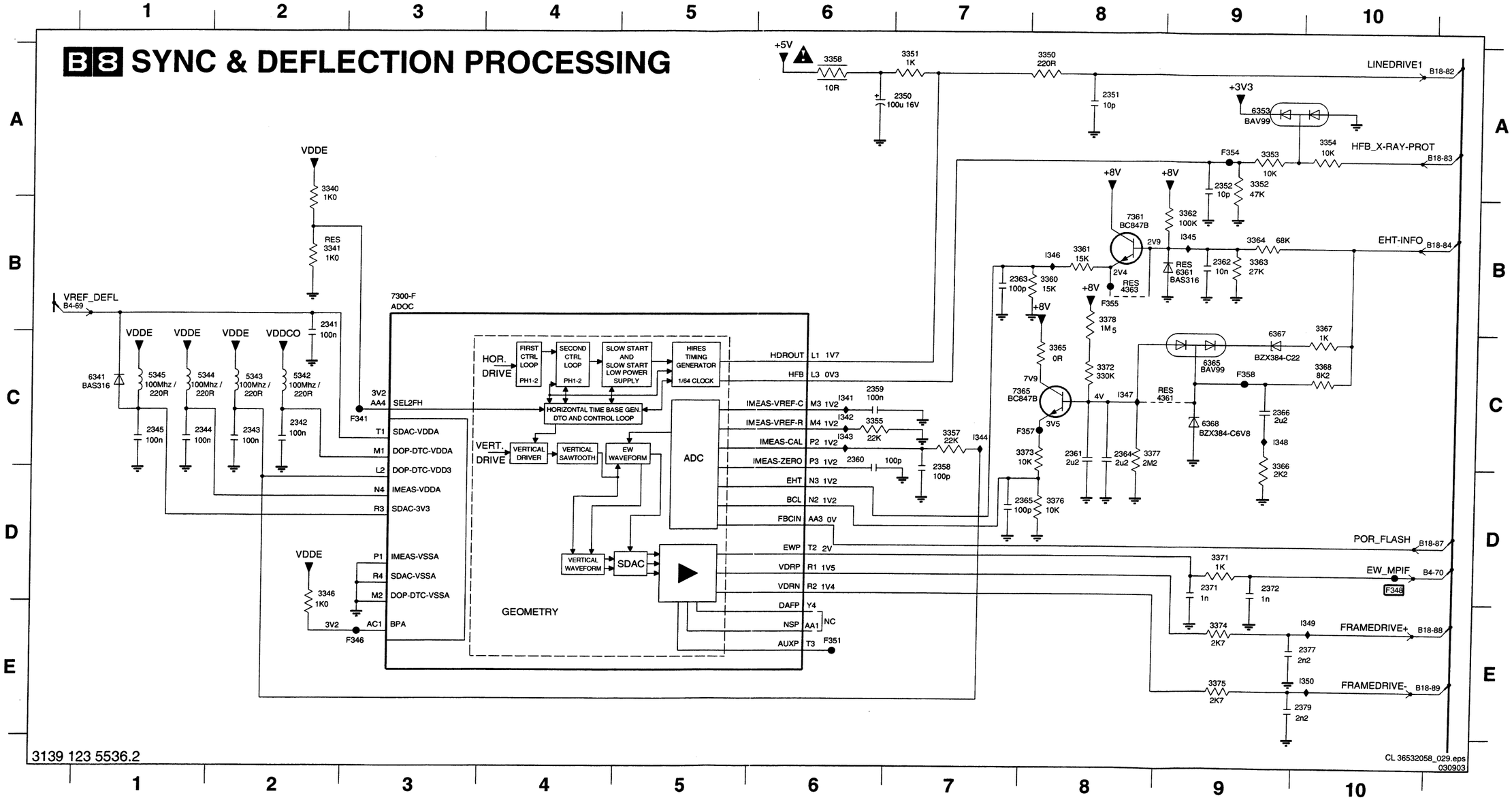
Small Signal Board: RGB Processing

2300 B1	2311 A9	2324 D4	2329 B8	3303 D7	3308 A5	3313 A8	3320 B8	3326 D4	3332 D8	3337 B4	3347 D6	5307 A5	6326 D4	7303 D8	7320-B B9	I301 C5	I306 A6
2305 E6	2317 B6	2325 C5	2331 C9	3304 D7	3309 A8	3316 B8	3321 C8	3328 C5	3333 D8	3338 D8	3348 D6	5317 B5	6327 E5	7304 D7	7330-A D8	I302 C6	I307 A5
2307 A6	2318 B5	2326 C6	2339 D8	3305 E7	3310 A8	3317 A5	3322 C8	3329 C8	3334 A4	3339 B5	3349 C6	5327 B5	7300-H A1	7310-A A8	7330-B D9	I303 D4	I308 A6
2308 A5	2319 A8	2327 B6	2346 E5	3306 E7	3311 A8	3318 D5	3323 C8	3330 C8	3335 B4	3343 E4	3356 E5	5328 C5	7301 A8	7310-B A9	7346 D5	I304 D5	I309 B5
2310 A9	2321 B9	2328 B5	3302 B1	3307 A8	3312 A8	3319 B8	3324 D5	3331 D8	3336 B4	3345 E5	5300 A1	6301 E7	7302 C8	7320-A B8	7356 E5	I305 A5	I310 B6



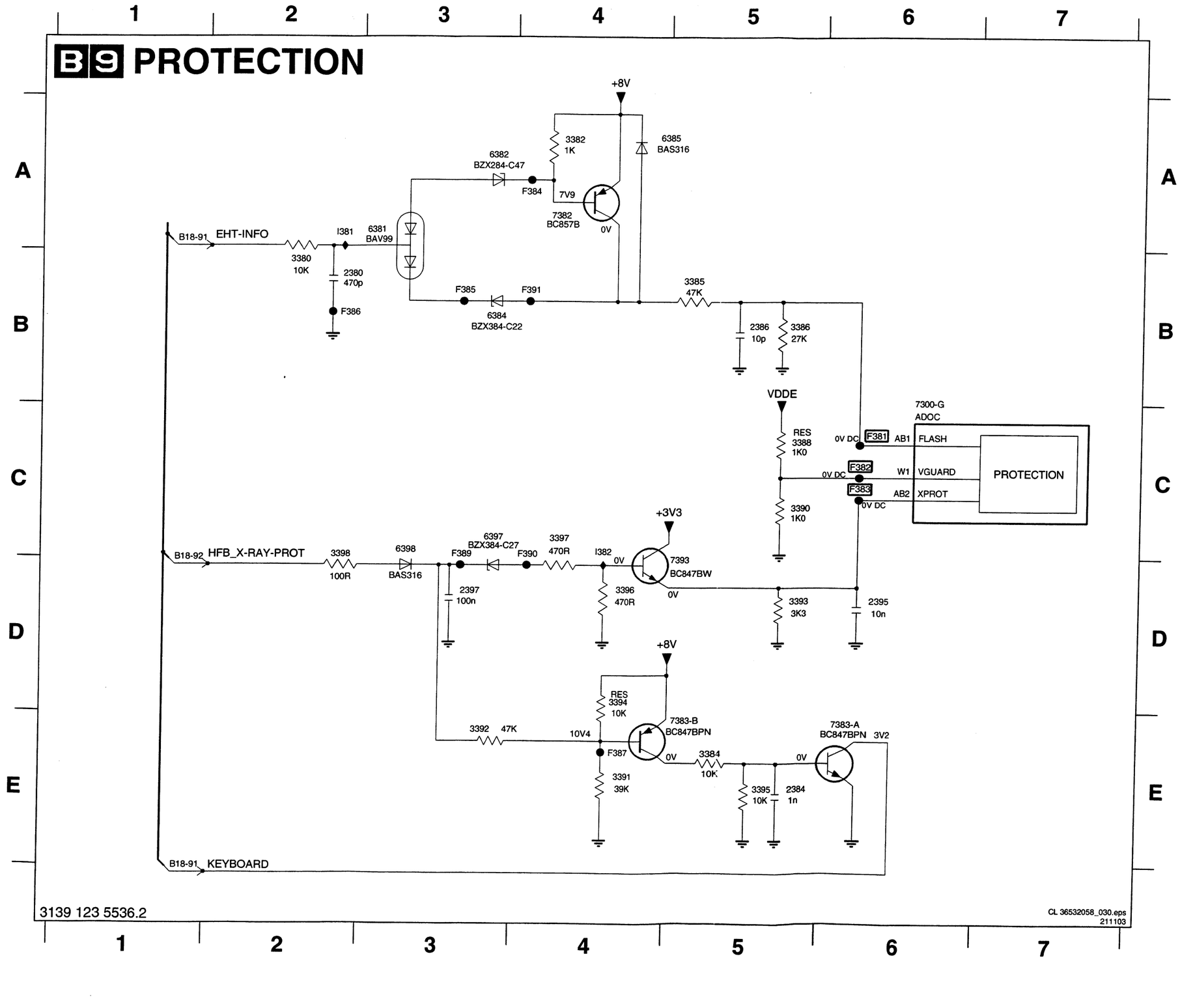
Small Signal Board: Sync & Deflection Processing

2341 B2	2350 A7	2360 C6	2365 D8	2379 E10	3351 A7	3357 C7	3363 B9	3368 C10	3375 E9	4363 B8	6341 C1	6368 C9	F346 E3	F357 C8	I344 C7	I349 E10
2342 C2	2351 A8	2361 C8	2366 C9	3340 A2	3352 A9	3358 A6	3364 B9	3371 D9	3376 D8	5342 C2	6353 A9	7300-F B3	F348 D10	F358 C9	I345 B9	I350 E10
2343 C2	2352 A9	2362 B9	2371 D9	3341 B2	3353 A9	3360 B8	3365 C8	3372 C8	3377 C8	5343 C2	6361 B9	7361 B8	F351 E6	I341 C6	I346 B8	
2344 C1	2358 D7	2363 B7	2372 D9	3346 D2	3354 A10	3361 B8	3366 C9	3373 C8	3378 B8	5344 C1	6365 C9	7365 C8	F354 A9	I342 C6	I347 C8	
2345 C1	2359 C6	2364 C8	2377 E10	3350 A8	3355 C6	3362 B9	3367 B10	3374 E9	4361 C9	5345 C1	6367 C9	F341 C3	F355 B8	I343 C6	I348 C9	



Small Signal Board: Protection

2380 B2 2386 B5 2395 E5	2395 D6 2397 D3 3380 B2	3382 A4 3384 E5 3385 B5	3386 B5 3388 C5 3390 C5	3391 E4 3392 E3 3393 D5	3394 D4 3395 E5 3396 D4	3397 C4 3398 C2 6381 A3	6382 A3 6384 B3 6385 A4	6397 C3 6398 C3 7300-G C6	7382 A4 7383-A E6 7383-B E5	7393 D5 F381 C6 F382 C6	F383 C6 F384 A4 F385 B3	F386 B2 F387 E4 F389 C3	F390 C4 F391 B4 I381 A2	I382 C4

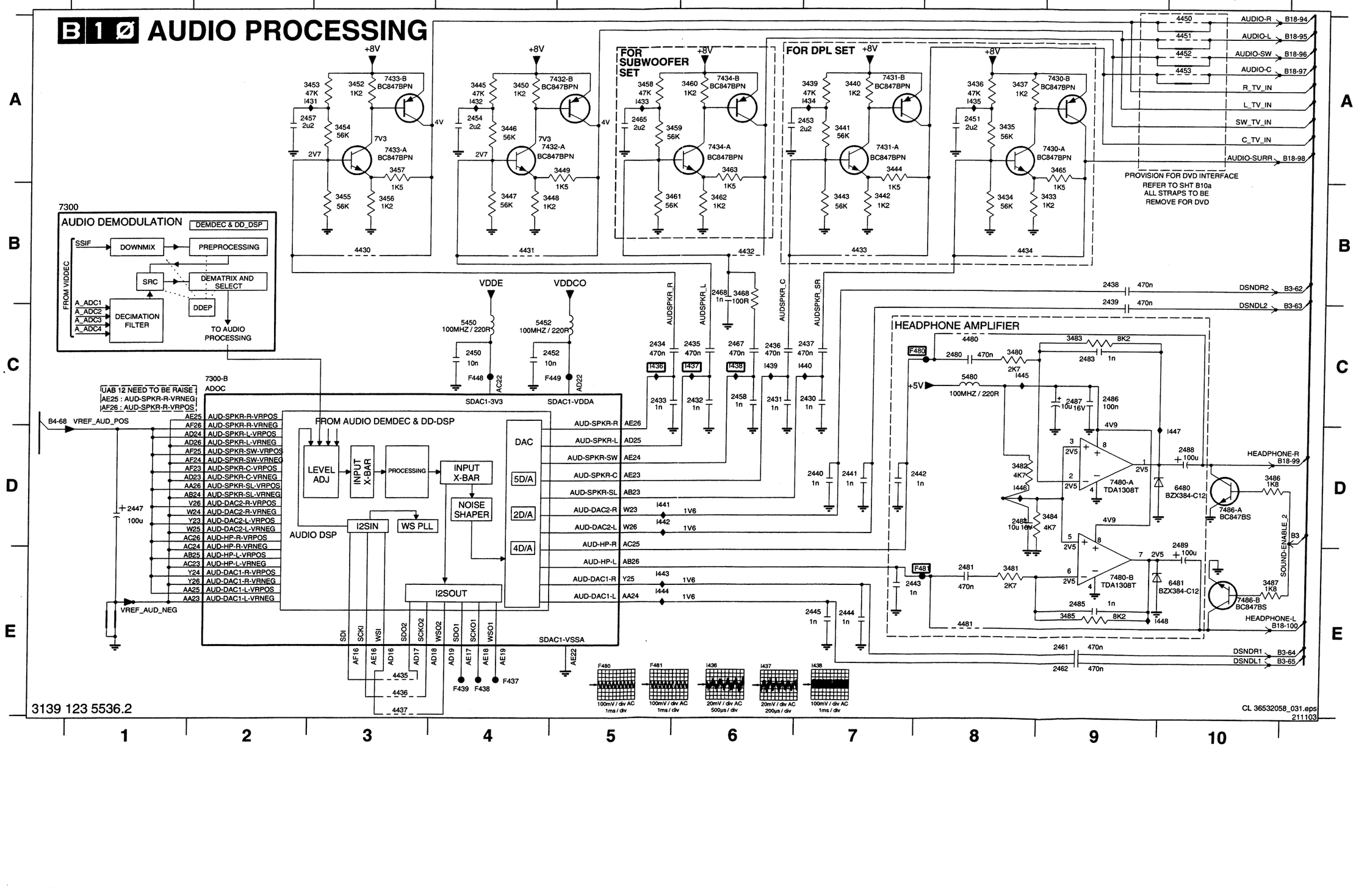


Small Signal Board: Audio Processing

2430 C7	2437 C7	2444 E7	2454 A4	2468 B6	2487 C9	3437 A8	3445 A4	3453 A2	3460 A6	3481 E8	4430 B3	4437 E3	5450 C4	7430-B A9	7434-A A6	F438 E4	I432 A4	I439 C6	I446 D8
2431 C6	2438 B9	2445 E7	2457 A2	2480 C8	2488 D10	3439 A7	3446 A4	3454 A3	3461 B5	3482 D8	4431 B4	4450 A10	5452 C4	7431-A A7	7434-B A6	F439 E4	I433 A5	I440 C7	I447 D10
2432 C6	2439 B9	2447 D1	2458 C6	2481 E8	2489 D10	3440 A7	3447 B4	3455 B3	3462 B6	3483 C9	4432 B6	4451 A10	5480 C8	7431-B A7	7480-A D9	F448 C4	I434 A7	I441 D5	I448 E10
2433 C5	2440 D7	2450 C4	2461 E9	2483 C9	3433 B9	3441 A7	3448 B4	3456 B3	3463 A6	3484 D9	4433 B7	4452 A10	6480 D10	7432-A A4	7480-B E9	F449 C4	I435 A8	I442 D5	
2434 C5	2441 D7	2451 A8	2462 E9	2484 D8	3434 B8	3442 B7	3449 A5	3457 A3	3465 A9	3485 E9	4434 B8	4453 A10	6481 E10	7432-B A4	7486-A D10	F480 C7	I436 C5	I443 E5	
2435 C6	2442 D8	2452 C4	2465 A5	2485 E9	3435 A8	3443 B7	3450 A4	3458 A5	3468 B6	3486 D10	4435 E3	4480 C8	7300-B C2	7433-A A3	7486-B E10	F481 E8	I437 C6	I444 E5	
2436 C6	2443 E7	2453 A7	2467 C6	2486 C9	3436 A8	3444 A7	3452 A3	3459 A5	3480 C8	3487 E10	4436 E3	4481 E8	7430-A A8	7433-B A3	F437 E4	I431 A2	I438 C6	I445 C8	

1 2 3 4 5 6 7 8 9 10

B10 AUDIO PROCESSING

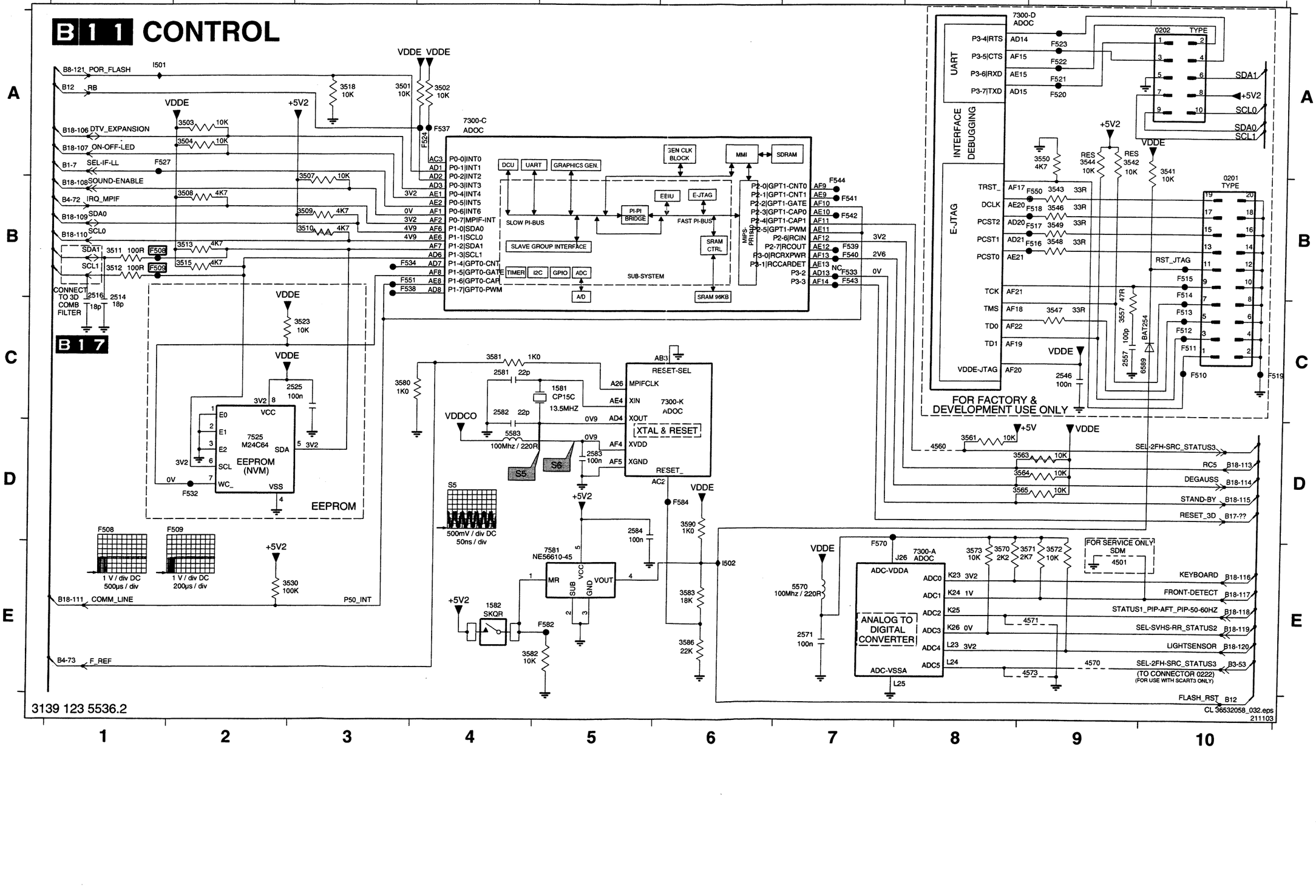


Small Signal Board: Control

0201 A10	2525 C3	2583 D5	3507 B3	3513 B2	3542 A9	3549 B9	3565 D8	3581 C4	4560 D3	6589 C10	7581 E5	F513 C10	F519 C10	F527 A1	F539 B7	F550 B9	I502 E6
0202 A10	2546 C9	2584 D5	3508 B2	3515 B2	3543 B9	3550 A9	3570 E8	3582 E4	4570 E9	7300-A E8	F508 B1	F514 B10	F520 A9	F532 D2	F540 B7	F551 B3	
1581 C5	2557 C9	3501 A3	3509 B3	3518 A3	3544 A9	3557 C9	3571 E9	3583 E6	4571 E9	7300-C A4	F509 B1	F515 B10	F521 A9	F533 B7	F541 B7	F570 E7	
1582 E4	2571 E7	3502 A4	3510 B3	3523 C3	3546 B9	3561 D8	3572 E9	3586 E6	4573 E9	7300-D A8	F510 C10	F516 B9	F522 A9	F534 B3	F542 B7	F582 E5	
2514 B1	2581 C4	3503 A2	3511 B1	3530 E3	3547 C9	3563 D8	3573 E8	3590 D6	5570 E7	7300-K C6	F511 C10	F517 B9	F523 A9	F537 A4	F543 B7	F584 D6	
2516 C1	2582 C4	3504 A2	3512 B1	3541 A10	3548 B9	3564 D9	3580 C3	4501 E9	5583 D4	7525 D2	F512 C10	F518 B9	F524 A4	F538 B3	F544 B7	I501 A1	

1 2 3 4 5 6 7 8 9 10

B 1 1 CONTROL



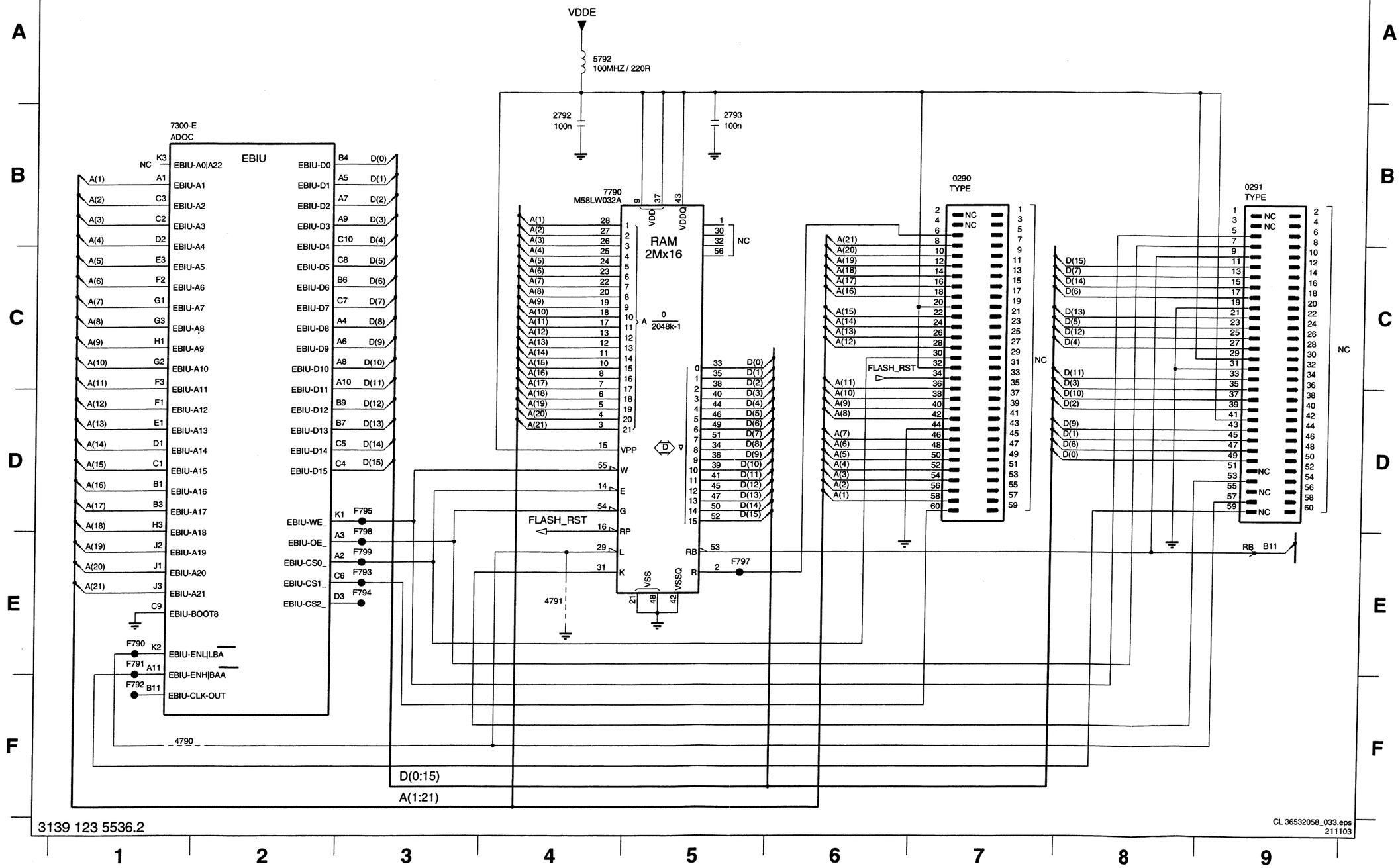
3139 123 5536.2

CL 36532058_032.eps 211103

Small Signal Board: Control-Memory Interface (EBIU)

B12 CONTROL-MEMORY INTERFACE (EBIU)

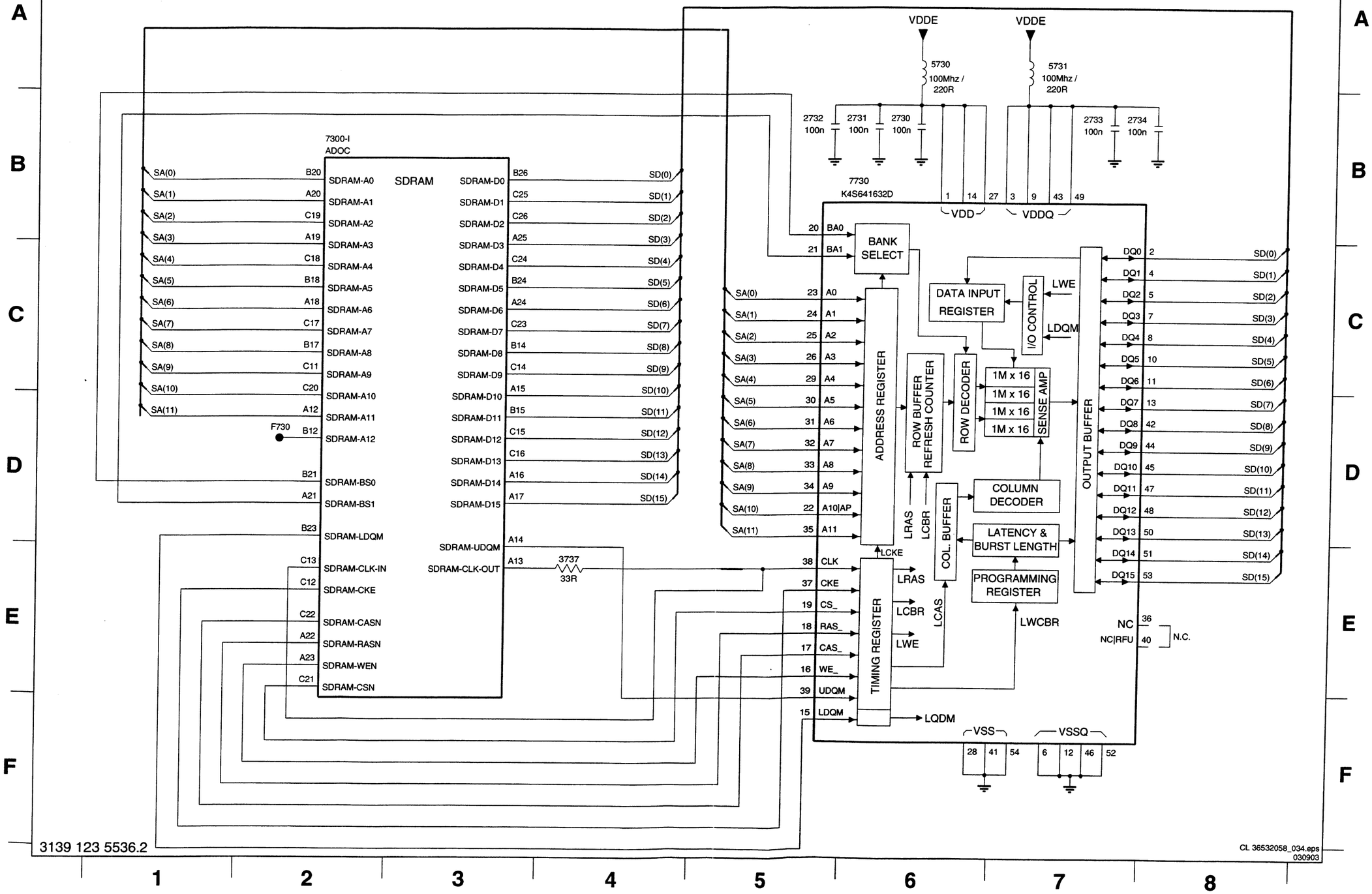
0290 B7
0291 B9
2792 B4
2793 B6
4790 F1
4791 E4
5792 A4
7300-E B1
7790 B4
F790 E1
F791 E1
F792 F1
F793 E3
F794 E3
F795 D3
F797 E5
F798 E3
F799 E3



Small Signal Board: Control-Memory Interface (SDRAM)

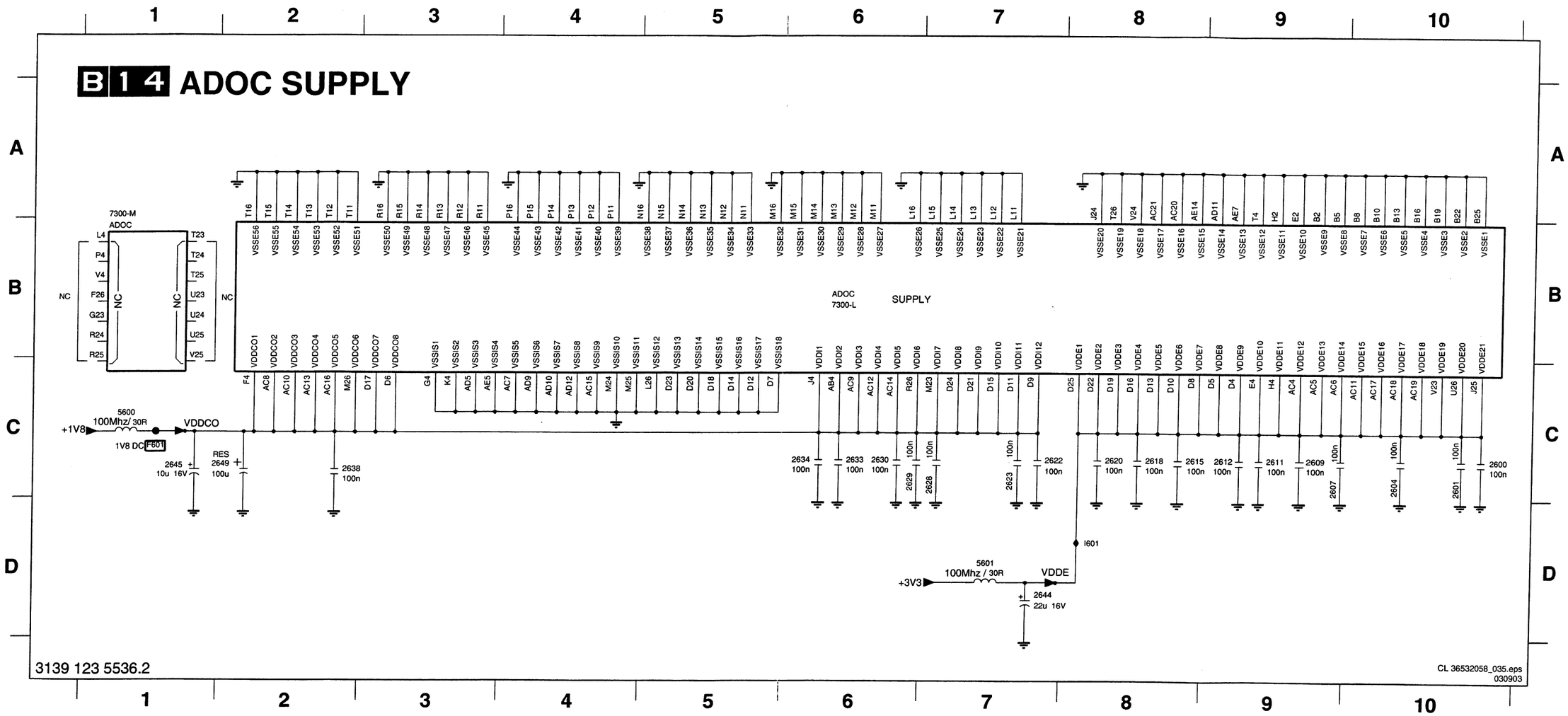
B13 CONTROL-MEMORY INTERFACE (SDRAM)

2730 B6
2731 B6
2732 B5
2733 B7
2734 B7
3737 E4
5730 A6
5731 A7
7300-I B2
7730 B6
F730 D2



Small Signal Board: ADOC Supply

2600 C10	2604 C10	2609 C9	2612 C9	2618 C8	2622 C7	2628 C7	2630 C6	2634 C6	2644 D7	2649 C2	5601 D7	7300-M A1	I601 D8
2601 C10	2607 C9	2611 C9	2615 C8	2620 C8	2623 C7	2629 C6	2633 C6	2638 C2	2645 C1	5600 C1	7300-L B6	F601 C1	


B14 ADOC SUPPLY
7300-M ADOC
NC
L4
P4
V4
F26
G23
R24
R25
T23
T24
T25
U23
U24
U25
V25
T16 T15 T14 T13 T12 T11
R16 R15 R14 R13 R12 R11
P16 P15 P14 P13 P12 P11
N16 N15 N14 N13 N12 N11
M16 M15 M14 M13 M12 M11
L16 L15 L14 L13 L12 L11
J24 T26 V24 AC21 AC20 AE14 AD11 AE7 T4 H2 E2 B2 B5 B8 B10 B13 B16 B19 B22 B25
VSSE56 VSSE55 VSSE54 VSSE53 VSSE52 VSSE51
VSSE50 VSSE49 VSSE48 VSSE47 VSSE46 VSSE45
VSSE44 VSSE43 VSSE42 VSSE41 VSSE40 VSSE39
VSSE38 VSSE37 VSSE36 VSSE35 VSSE34 VSSE33
VSSE32 VSSE31 VSSE30 VSSE29 VSSE28 VSSE27
VSSE26 VSSE25 VSSE24 VSSE23 VSSE22 VSSE21
VSSE20 VSSE19 VSSE18 VSSE17 VSSE16 VSSE15 VSSE14 VSSE13 VSSE12 VSSE11 VSSE10 VSSE9 VSSE8 VSSE7 VSSE6 VSSE5 VSSE4 VSSE3 VSSE2 VSSE1
ADOC 7300-L SUPPLY
VDDCO1 VDDCO2 VDDCO3 VDDCO4 VDDCO5 VDDCO6 VDDCO7 VDDCO8
F4 AC8 AC10 AC13 AC16 M26 D17 D6
VSSIS1 VSSIS2 VSSIS3 VSSIS4 VSSIS5 VSSIS6 VSSIS7 VSSIS8 VSSIS9 VSSIS10 VSSIS11 VSSIS12 VSSIS13 VSSIS14 VSSIS15 VSSIS16 VSSIS17 VSSIS18
G4 K4 AD5 AE5 AC7 AD9 AD10 AD12 AC15 M24 M25 L26 D23 D20 D18 D14 D12 D7
VDDI1 VDDI2 VDDI3 VDDI4 VDDI5 VDDI6 VDDI7 VDDI8 VDDI9 VDDI10 VDDI11 VDDI12
J4 AB4 AC9 AC12 AC14 R26 M23 D24 D21 D15 D11 D9
VDDE1 VDDE2 VDDE3 VDDE4 VDDE5 VDDE6 VDDE7 VDDE8 VDDE9 VDDE10 VDDE11 VDDE12 VDDE13 VDDE14 VDDE15 VDDE16 VDDE17 VDDE18 VDDE19 VDDE20 VDDE21
D25 D22 D19 D16 D13 D10 D8 D5 D4 E4 H4 AC4 AC5 AC6 AC11 AC17 AC18 AC19 V23 U26 J25
5600
100Mhz/ 30R
+1V8
1V8 DC
F601
VDDCO
2645 10u 16V
RES 2649 100u
2638 100n
2634 100n
2633 100n
2630 100n
2629 100n
2628 100n
2623 100n
2622 100n
2620 100n
2618 100n
2615 100n
2612 100n
2611 100n
2609 100n
2607 100n
2604 100n
2601 100n
2600 100n
I601
5601
100Mhz / 30R
+3V3
VDDE
2644
22u 16V
3139 123 5536.2
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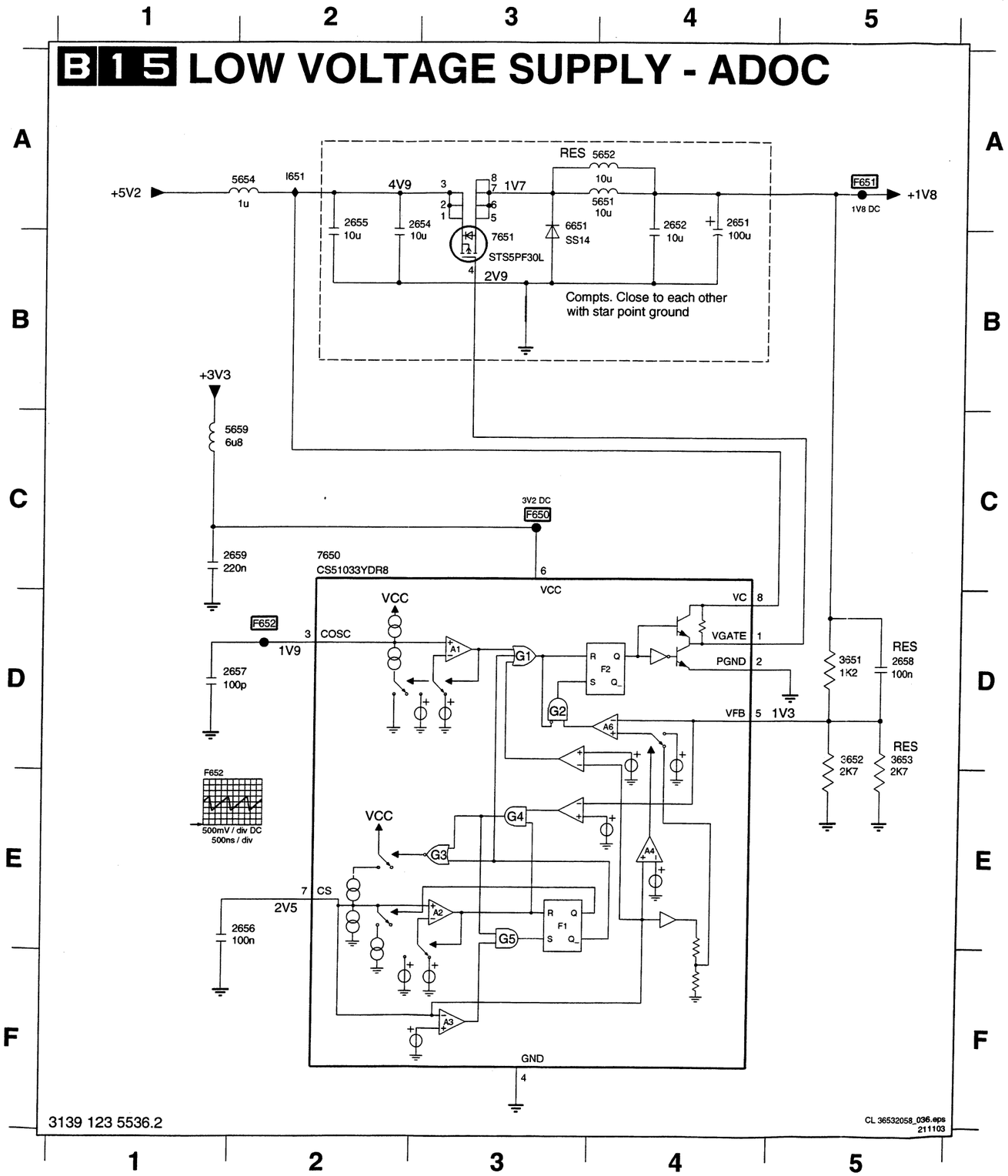
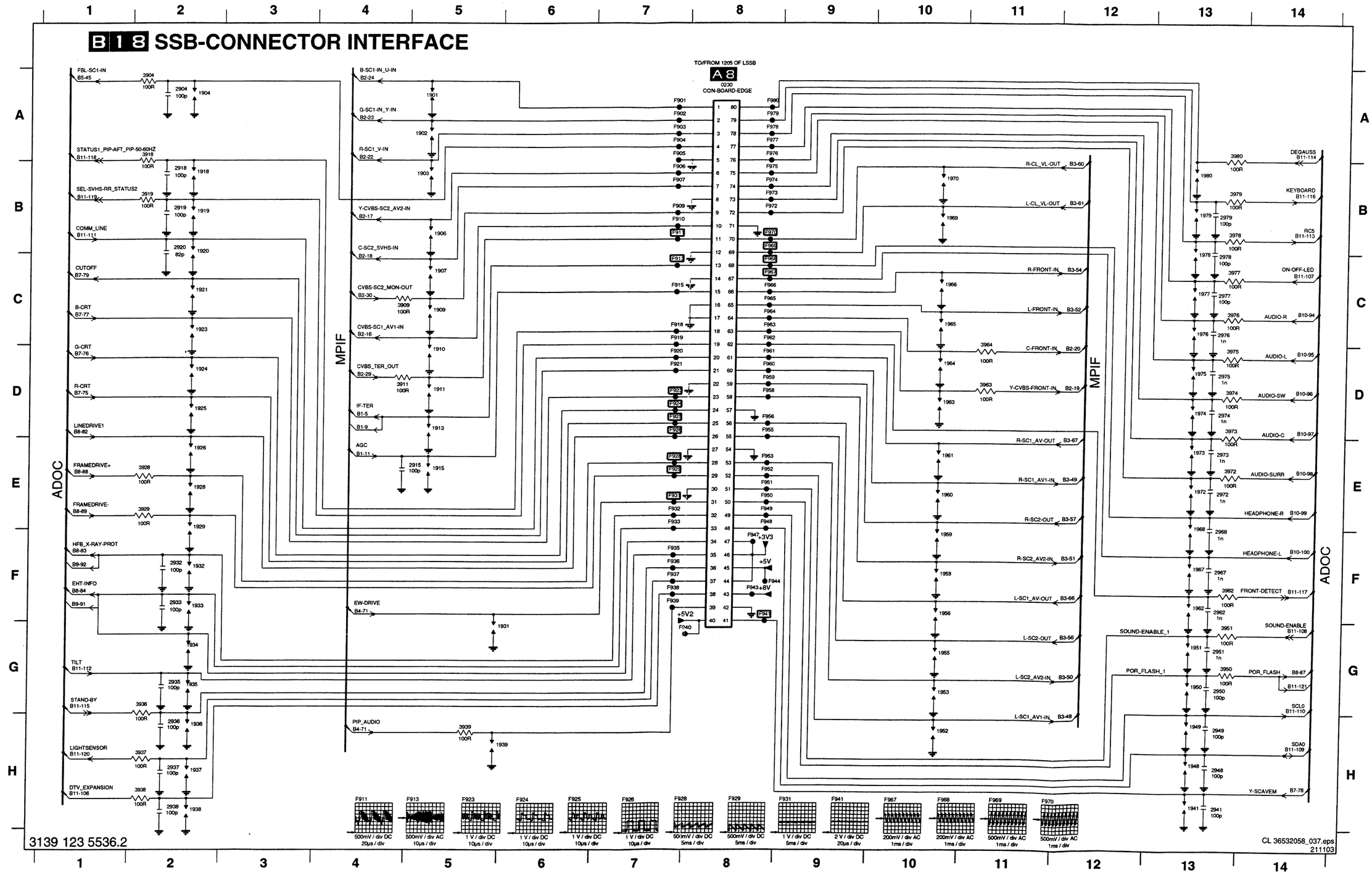
Small Signal Board: Low Voltage Supply ADOC



2651 A4
2652 A4
2654 A2
2655 A2
2656 E2
2657 D2
2658 D5
2659 C2
3651 D5
3652 D5
3653 D5
5651 A4
5652 A4
5654 A2
5659 C2
6651 A3
7650 C2
7651 B3
F650 C3
F651 A5
F652 D2
I651 A2

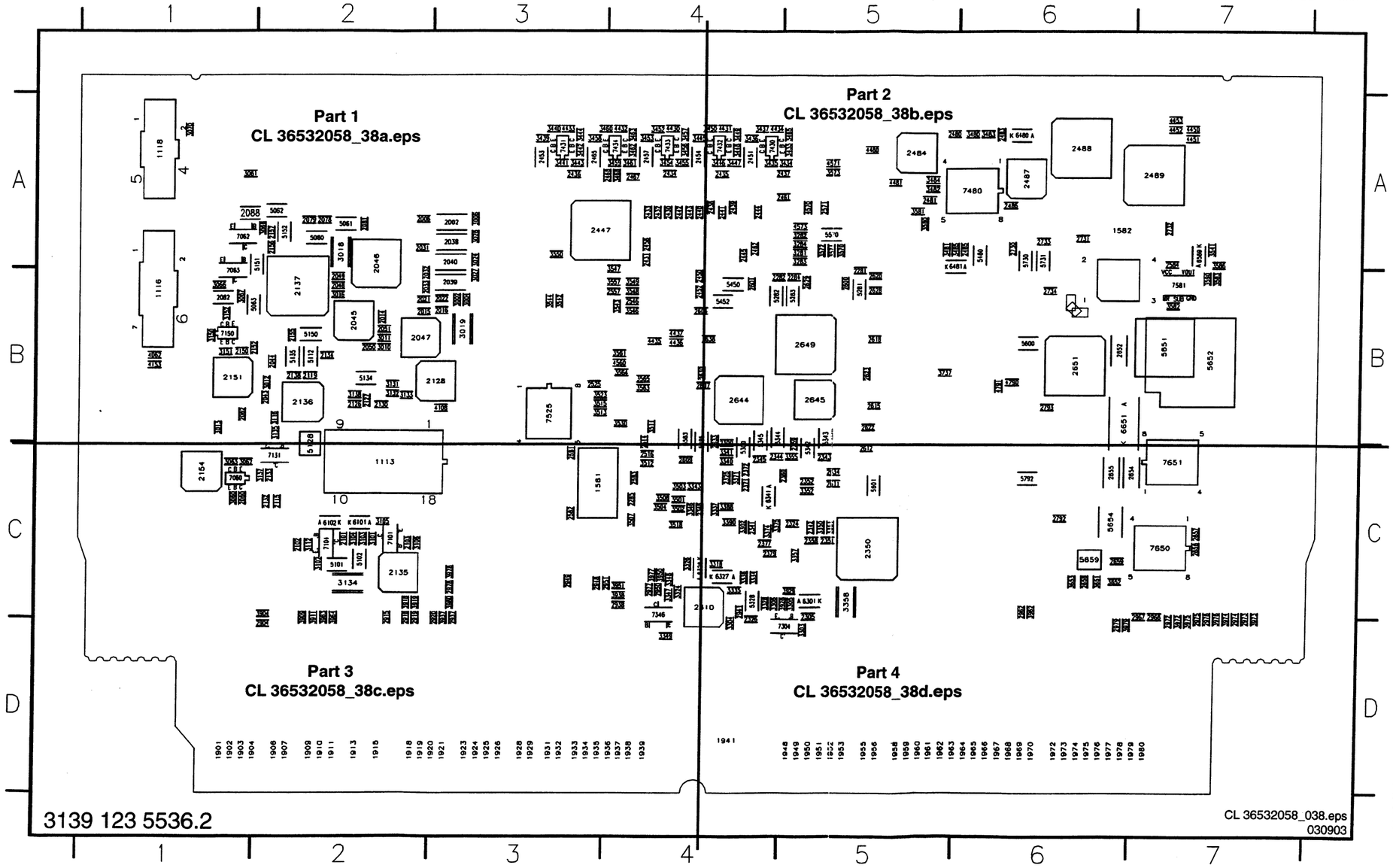
Small Signal Board: Connector Interface

0230 A8 1901 A5 1902 A5 1903 B5 1904 A2 1906 B5
1907 C5 1909 C5 1910 D5 1911 D5 1913 D5 1915 E5
1918 B2 1919 B2 1920 B2 1921 C2 1923 C2 1924 D2
1925 D2 1926 E2 1928 E2 1929 E2 1931 G6 1932 F2
1933 F2 1934 G2 1935 G2 1936 H2 1937 H2 1938 H2
1939 H6 1941 H13 1948 H13 1949 H13 1950 G13 1951 G13
1952 H10 1953 G10 1955 G10 1956 F10 1958 F10 1959 F10
1960 E10 1961 E10 1962 F13 1963 D10 1964 D10 1965 C10
1966 C10 1967 F13 1968 E13 1969 B10 1970 B10 1972 E13
1973 E13 1974 D13 1975 D13 1976 C13 1977 C13 1978 C13
1979 B13 1980 B13 2904 A2 2915 E5 2918 B2 2919 B2
2920 B2 2932 F2 2933 F2 2935 G2 2936 H2 2937 H2
2938 H2 2941 H13 2948 H13 2949 H13 2950 G13 2951 G13
2962 F13 2967 F13 2968 E13 2972 E13 2973 E13 2974 D13
2975 D13 2976 C13 2977 C13 2978 C13 2979 B13 3904 A2
3909 C4 3911 D4 3918 A2 3919 B2 3928 E2 3929 E2
3935 G2 3937 H2 3939 H5 3950 G13 3951 G13
3962 F13 3963 D11 3964 D11 3972 E13 3973 D13 3974 D13
3975 D13 3976 C13 3977 C13 3978 B13 3979 B13 3980 A13
F901 A7 F902 A7 F903 A7 F904 A7 F905 A7 F906 B7
F907 B7 F909 B7 F910 B7 F911 B7 F913 C7 F915 C7
F918 C7 F919 C7 F920 D7 F921 D7 F923 D7 F924 D7
F925 D7 F926 D7 F928 E7 F929 E7 F931 E7 F932 E7
F933 E7 F935 F7 F936 F7 F937 F7 F938 F7 F939 F7
F940 G8 F941 F8 F943 F8 F944 F8 F947 F8 F948 E8
F949 E8 F950 E8 F951 E8 F952 E8 F953 E8 F955 D8
F956 D8 F958 D8 F959 D8 F960 D8 F961 D8 F962 C8
F963 C8 F964 C8 F965 C8 F966 C8 F967 C8 F968 C8
F969 B8 F970 B8 F972 B8 F973 B8 F974 B8 F975 B8
F976 A8 F977 A8 F978 A8 F979 A8 F980 A8



Layout SSB (Overview LOT Side)

1113 C2 2022 B3 2047 B2 2088 A1 2133 C2 2156 A2 2326 D4 2359 C5 2435 A4 2447 A3 2467 A4 2514 B4 2601 B4 2628 B5 2654 C6 2792 C6 2949 C3 2977 C4 3018 A2
1116 B1 2031 A2 2048 B2 2101 C2 2134 B2 2157 A2 2341 C4 2360 C5 2436 A3 2450 B4 2468 A3 2516 C4 2604 B4 2629 B5 2655 C6 2793 B6 2950 C4 2978 C3 3019 B3
1118 A1 2032 B2 2049 B2 2102 C2 2135 C2 2281 B5 2342 C5 2371 C4 2437 A5 2451 A4 2480 A5 2525 B3 2607 B4 2630 B4 2656 C7 2904 D2 2951 C4 2979 D6 3024 A3
1581 C3 2033 B2 2050 B2 2103 C2 2136 B2 2282 B4 2343 C5 2372 C4 2438 A4 2452 B4 2481 A5 2546 B4 2609 C4 2633 B4 2657 C7 2915 D2 2962 C6 3002 B3 3026 A3
1582 A6 2038 A3 2051 B2 2115 C2 2137 B2 2284 B5 2344 C4 2377 C4 2439 A4 2453 A3 2483 A6 2557 B4 2611 C5 2634 C5 2658 C6 2918 D2 2967 C7 3004 B3 3027 B3
2002 A3 2039 B3 2060 C1 2119 B2 2138 B2 2285 C4 2345 C4 2379 C4 2440 A4 2454 A4 2484 A5 2571 A5 2612 C5 2638 B4 2659 C6 2919 D2 2968 C7 3006 A3 3060 C1
2006 A2 2040 A3 2062 B1 2126 B2 2150 B1 2300 B4 2346 C4 2430 A4 2441 A4 2457 A4 2485 A6 2581 C3 2615 B5 2644 B4 2730 A6 2920 D3 2972 D7 3010 B2 3061 A1
2014 B2 2043 B2 2078 A2 2127 B2 2151 B1 2305 C5 2350 C5 2431 A4 2442 A4 2458 A4 2486 A6 2582 C3 2618 B5 2645 B5 2731 A6 2937 D3 2973 D7 3011 B2 3062 C1
2015 B2 2044 B2 2079 A2 2128 B3 2152 B1 2310 C4 2351 C5 2432 A4 2443 A4 2461 A5 2487 A6 2583 C4 2620 B5 2649 B5 2732 A7 2938 C4 2974 D7 3012 B2 3063 C1
2016 B3 2045 B2 2081 A2 2130 B2 2154 C1 2324 C5 2352 C5 2433 A4 2444 A4 2462 A4 2488 A6 2584 A7 2622 B5 2651 B6 2733 A6 2941 C4 2975 D7 3013 B1 3066 B1
2021 B2 2046 A2 2082 B1 2132 C2 2155 B2 2325 C4 2358 C5 2434 A4 2445 A4 2465 A3 2489 A7 2600 B5 2623 B5 2652 B6 2734 B6 2948 C3 2976 D7 3016 B2 3067 B1



3068 A2 3448 A4 3928 C5 5600 B6
3070 A1 3449 A4 3929 C5 5601 C5
3101 C2 3450 A4 3937 D3 5651 B7
3102 C2 3452 A4 3938 C4 5652 B7
3103 C2 3453 A4 3950 C4 5654 C6
3104 C2 3454 A4 3951 C4 5659 C6
3105 C2 3455 A4 3962 C6 5730 A6
3106 C2 3456 A4 3963 D2 5731 A6
3112 C2 3457 A4 3964 D2 5792 C6
3116 B2 3458 A3 3972 D7 6101 C2
3131 B2 3459 A4 3973 D7 6102 C2
3132 B2 3460 A3 3974 D7 6301 C5
3133 B2 3461 A4 3975 D7 6326 C4
3134 C2 3462 A4 3976 D7 6327 C4
3135 B2 3463 A4 3977 C4 6341 C4
3137 C2 3465 A5 3978 C3 6480 A6
3138 B2 3468 A4 3979 D6 6481 A5
3150 B1 3480 A6 3980 C3 6589 A7
3151 B1 3481 A5 4062 B1 6651 B6
3152 B1 3482 A5 4108 B3 7060 C1
3281 A5 3483 A6 4153 B1 7062 A1
3282 A5 3484 A5 4430 A4 7063 B1
3283 A5 3485 A5 4431 A4 7101 C2
3284 A5 3501 C4 4432 A4 7104 C2
3302 C4 3502 C4 4433 A3 7131 C2
3303 D5 3503 C4 4434 A4 7150 B1
3304 D4 3504 C4 4435 B4 7304 D5
3305 C5 3507 C4 4436 B4 7346 C4
3306 C4 3508 C4 4437 B4 7430 A4
3318 C4 3511 B4 4450 A7 7431 A3
3324 C4 3512 C4 4451 A7 7432 A4
3326 C4 3513 B3 4452 A7 7433 A4
3328 C4 3515 B3 4453 A7 7434 A4
3334 C4 3518 C4 4480 A5 7480 A6
3335 C4 3523 B3 4481 A5 7525 B3
3336 C4 3530 B4 4560 B4 7581 B7
3337 C4 3541 A7 4570 A5 7650 C7
3340 C4 3542 B3 4571 A5 7651 C7
3341 C4 3543 B4 4573 A5
3343 C4 3544 B3 4790 B6
3346 C4 3546 B4 4791 B6
3347 C4 3547 B4 5060 A2
3348 C4 3548 B4 5061 A2
3349 D4 3549 B4 5062 A2
3350 C5 3550 A3 5063 B1
3351 C5 3557 B4 5101 C2
3352 C5 3561 B4 5102 C2
3355 C5 3563 B4 5112 B2
3357 C5 3564 B4 5128 C2
3358 C5 3565 B4 5134 B2
3371 C4 3570 A5 5135 B2
3374 C4 3571 A5 5150 B2
3375 C4 3572 A5 5151 A2
3388 C4 3573 A5 5152 A2
3390 C4 3580 A5 5281 B5
3433 A5 3581 A5 5282 B4
3434 A5 3582 B7 5283 B5
3435 A4 3583 B7 5285 B4
3436 A4 3586 A7 5300 C4
3437 A4 3590 B7 5328 C4
3439 A3 3651 C6 5342 C5
3440 A3 3652 C6 5343 B5
3441 A3 3653 C6 5344 B4
3442 A3 3737 B5 5345 B4
3443 A3 3904 C2 5450 B4
3444 A3 3909 D2 5452 B4
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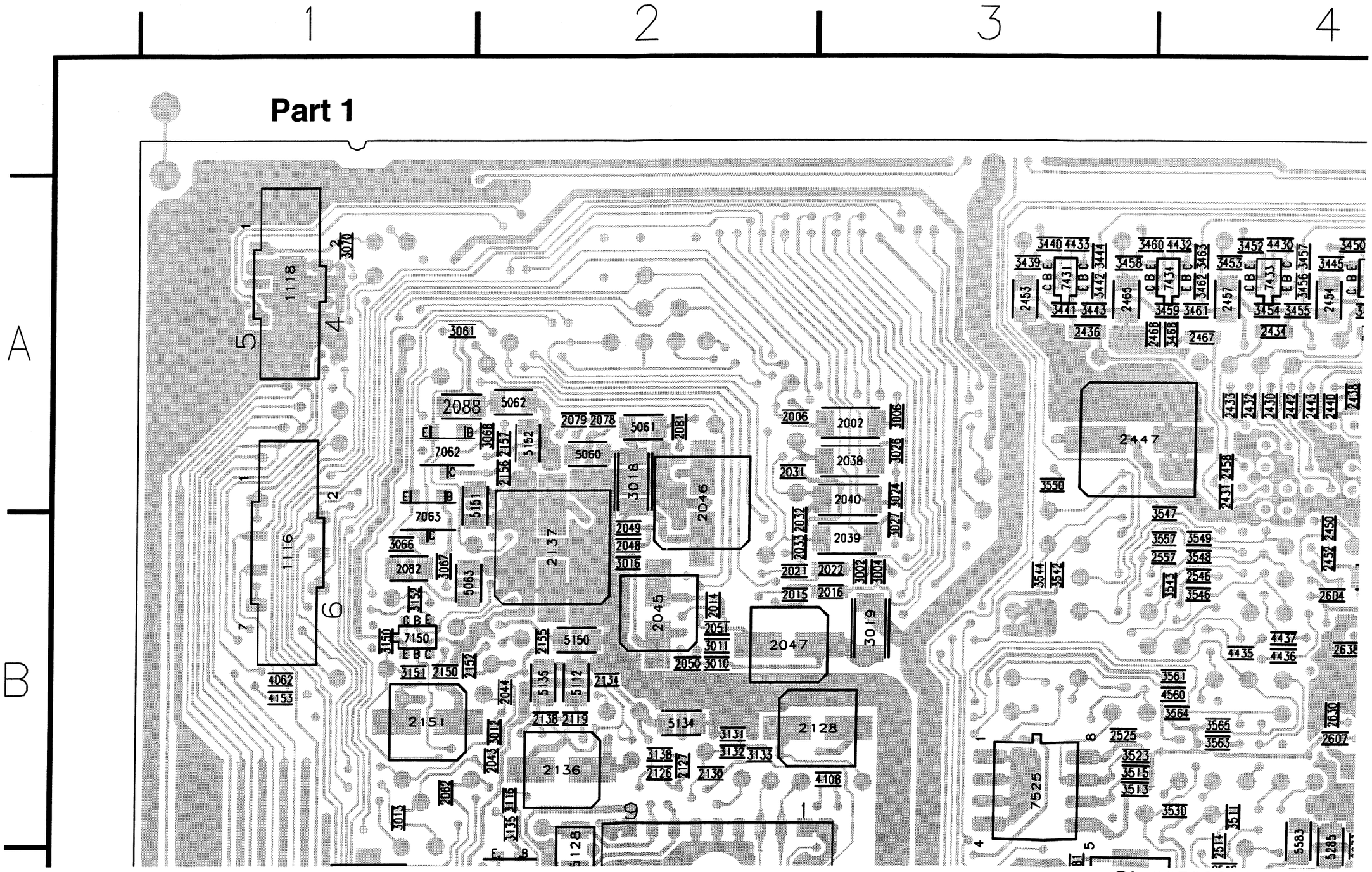
3447 A4 3919 C2 5583 B4

Layout SSB (Part 1 LOT Side)



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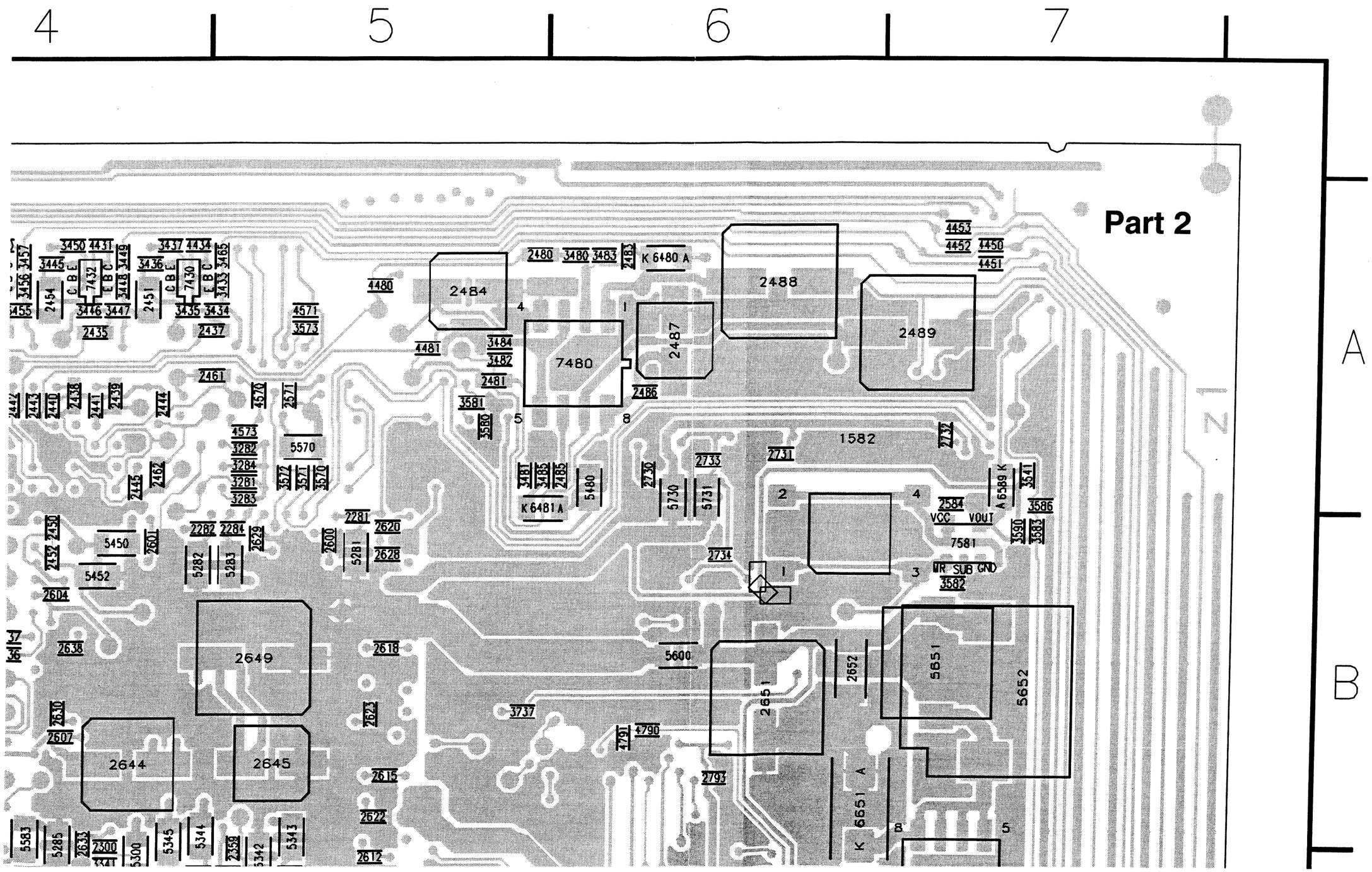
Layout SSB (Part 2 LOT Side)



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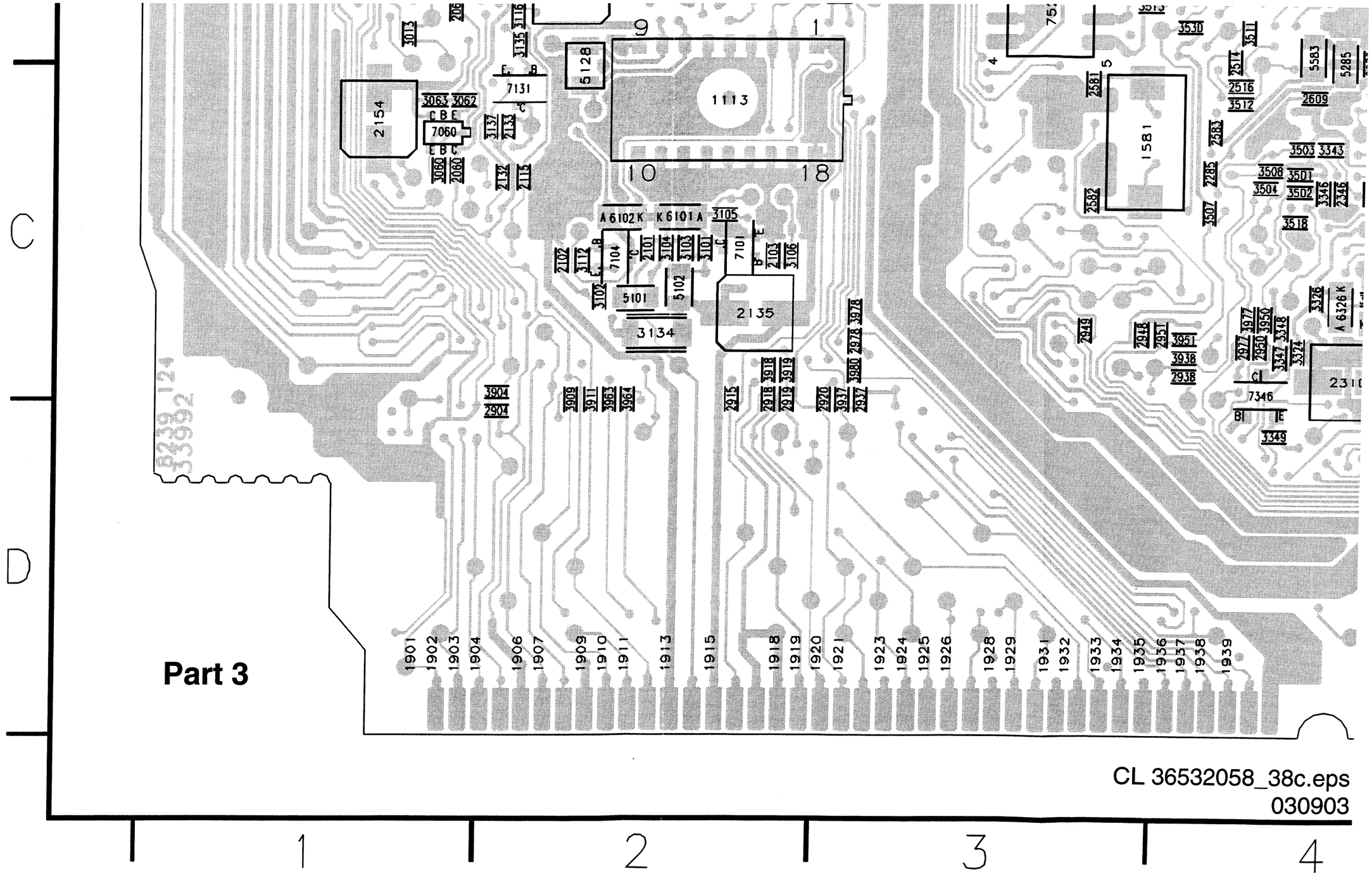
Layout SSB (Part 3 LOT Side)



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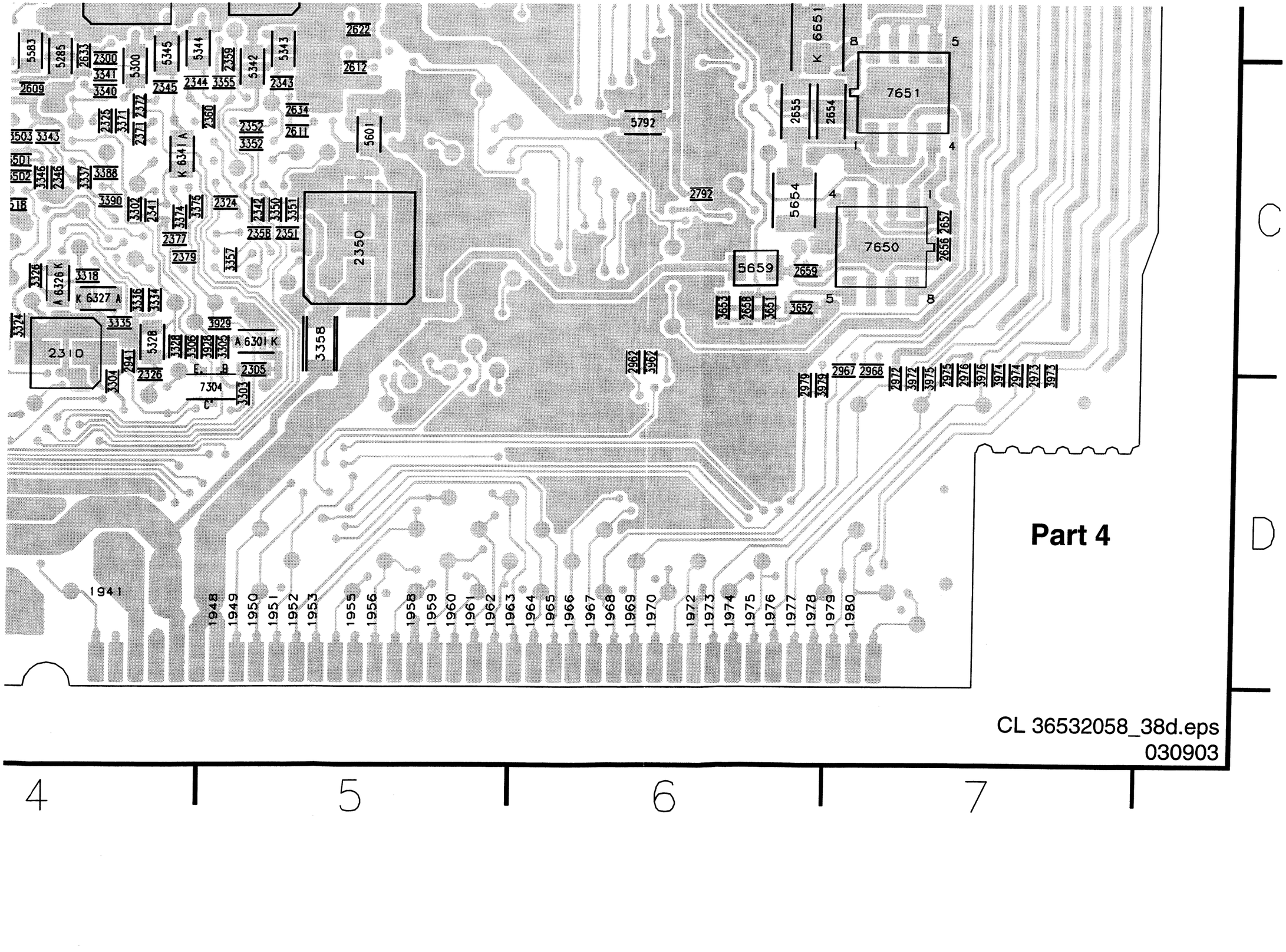
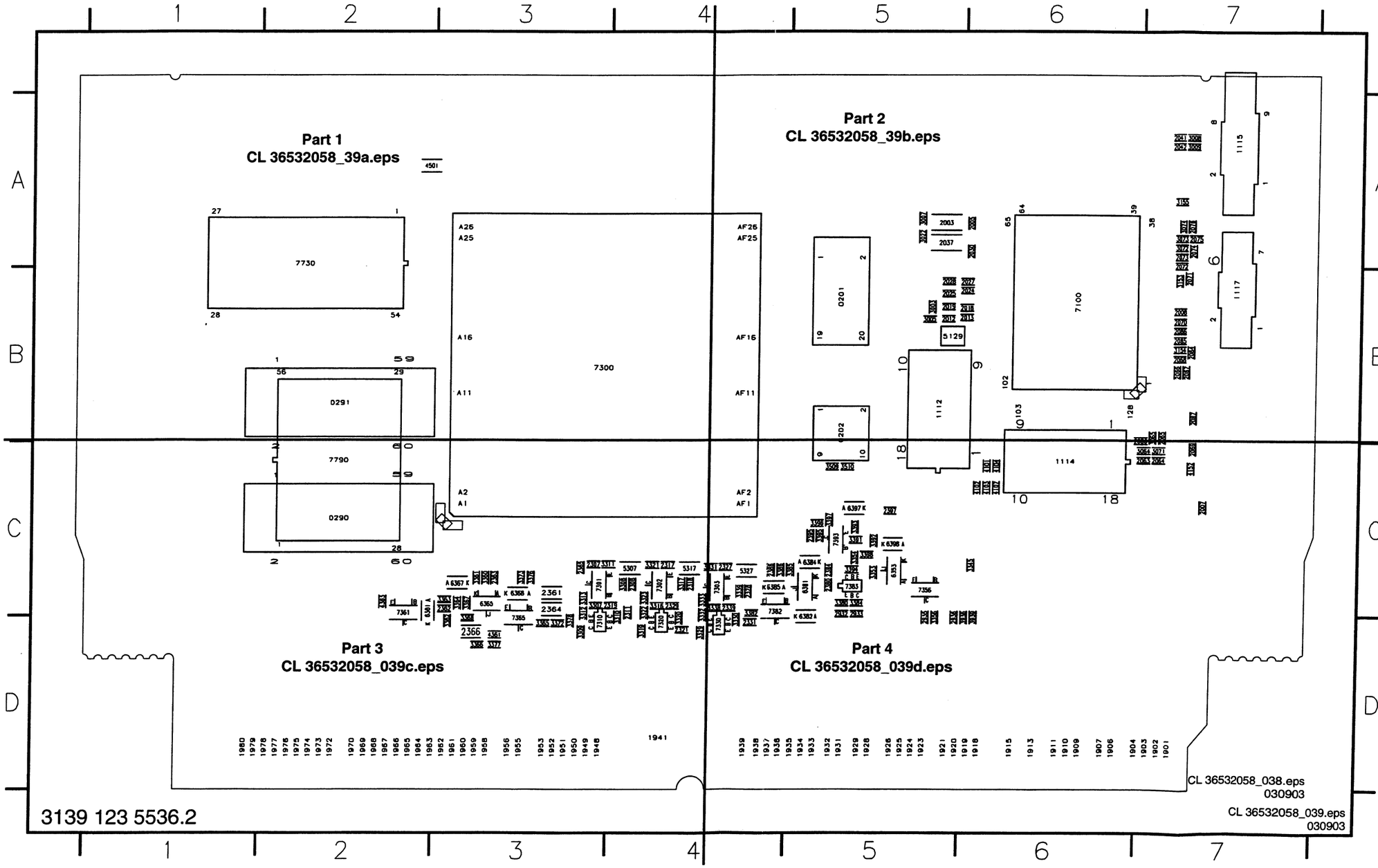
030903

Layout SSB (Part 4 LOT Side)



Layout SSB (Overview Tuner Side)

0201	B5	1901	D7	1911	D6	1924	D5	1934	D5	1949	D3	1959	D3	1967	D2	1976	D2	2008	B7	2028	B5	2066	B7	2074	A7	2307	C3	2328	C4	2365	C3	2933	C5	3022	A5	3154	B7
0202	B5	1902	D7	1913	D6	1925	D5	1935	D5	1950	D3	1960	D3	1968	D2	1977	D2	2012	B5	2030	A6	2067	B7	2075	A7	2308	C4	2329	C4	2366	D3	2935	D5	3064	C7	3155	A7
0290	C2	1903	D7	1915	D6	1926	D5	1936	D4	1951	D3	1961	D3	1969	D2	1978	D2	2013	B6	2037	A5	2068	B7	2076	A7	2311	C4	2331	D4	2380	C5	2936	D5	3065	B7	3307	C3
0291	B2	1904	D6	1918	D6	1928	D5	1937	D4	1952	D3	1962	D3	1970	D2	1979	D1	2018	B6	2041	A7	2069	C7	2083	B7	2317	C4	2339	C4	2384	C5	3003	B5	3071	C7	3308	C4
1112	B5	1906	D6	1919	D6	1929	D5	1938	D4	1953	D3	1963	D2	1972	D2	1980	D1	2019	B5	2042	A7	2070	B7	2084	B7	2318	C4	2361	C3	2386	C4	3005	B5	3072	A7	3309	D3
1114	C6	1907	D6	1920	D5	1931	D5	1939	D4	1955	D3	1964	D2	1973	D2	2003	A5	2024	B6	2063	C7	2071	B7	2085	B7	2319	C4	2362	C3	2395	C5	3007	A5	3073	A7	3310	D4
1115	A7	1909	D6	1921	D5	1932	D5	1941	D4	1956	D3	1965	D2	1974	D2	2005	A6	2025	B5	2064	C7	2072	A7	2086	B7	2321	D4	2363	C3	2397	C5	3008	A7	3074	A7	3311	C3
1117	B7	1910	D6	1923	D5	1933	D5	1948	D3	1958	D3	1966	D2	1975	D2	2007	C7	2027	B6	2065	B7	2073	A7	2087	B7	2327	C4	2364	C3	2932	C5	3009	A7	3153	B7	3312	C3



3313	C3	6397	C5																												
3316	C4	6398	C5																												
3317	C4	7100	B6																												
3319	D4	7300	B3																												
3320	D4	7301	C3																												
3321	C4	7302	C4																												
3322	C4	7303	C4																												
3323	C4	7310	D3																												
3329	D4	7320	D4																												
3330	D4	7330	D4																												
3331	C4	7356	C5																												
3332	C4	7361	C2																												
3333	C4	7365	D3																												
3338	C4	7382	C4																												
3339	C4	7383	C5																												
3345	C6	7393	C5																												
3353	C5	7730	A2																												
3354	C5	7790	C2																												
3356	D5																														
3360	C3																														
3361	C3																														
3362	D3																														
3363	C3																														
3364	C3																														
3365	D3																														
3366	D3																														
3367	C3																														
3368	D3																														
3372	D3																														
3373	C3																														
3376	C3																														
3377	D3																														
3378	D3																														
3380	C5																														
3382	C4																														
3384	C5																														
3385	C5																														
3386	C4																														
3391	C5																														
3392	C5																														
3393	C5																														
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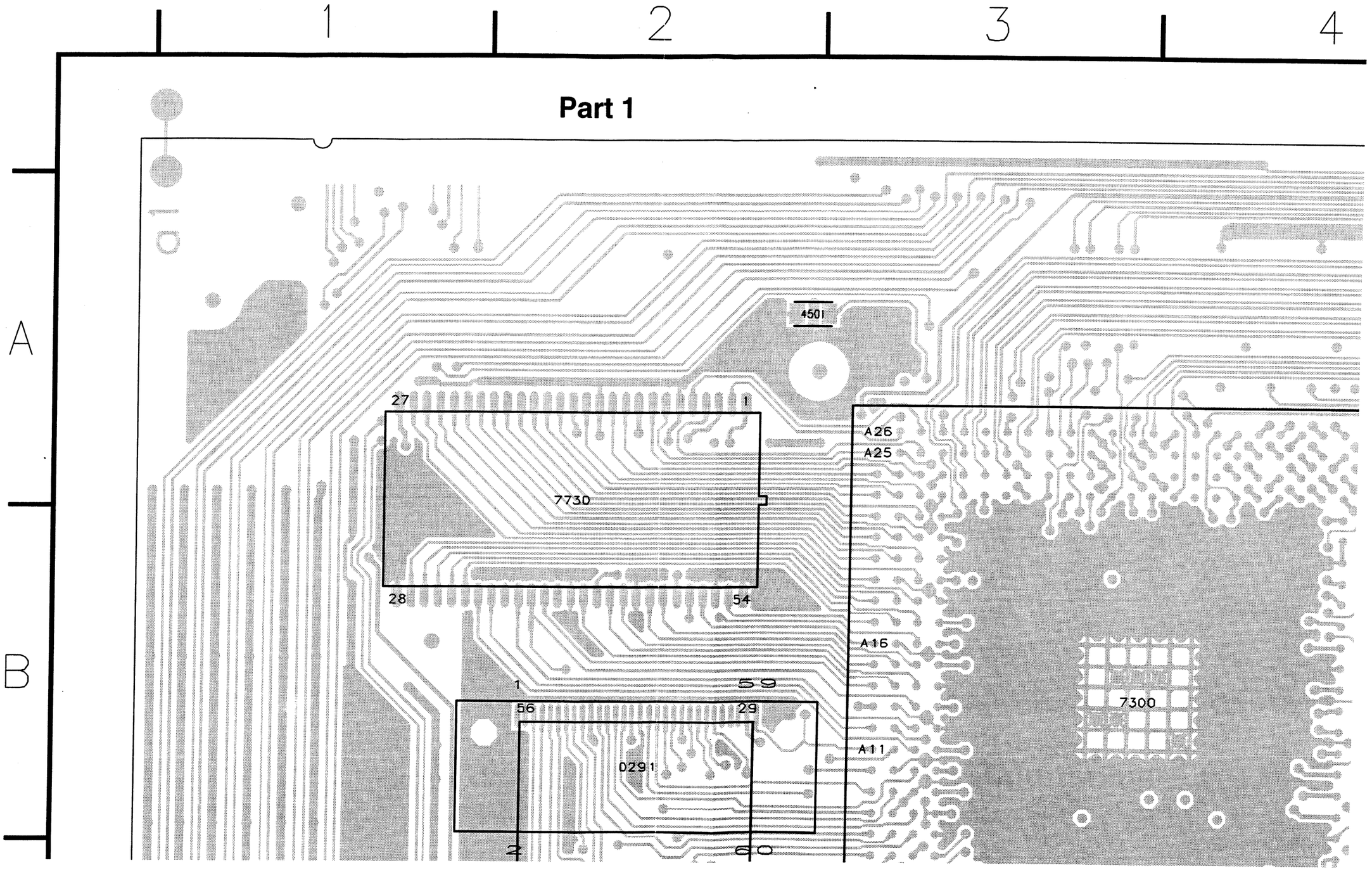
3396	C5																														
3397	C5																														
3398	C5																														
3509	C5																														
3510	C5																														
3936	D6																														
3939	D6																														
4101	C6																														
4102	C6																														
4103	C6																														
4104	C6																														
4107	C6																														
4152	C7																														
4361	D3																														
4363	C2																														
4501	A2																														
5129	B5																														
5307	C4																														
5317	C4																														
5327	C4																														
6353	C5																														
6361	C2																														
6365	C3																														
6367	C3																														
6368	C3																														
6381	C5																														
6382	D5																														
6384	C5																														
6385	C4																														

Layout SSB (Part 1 Tuner Side)



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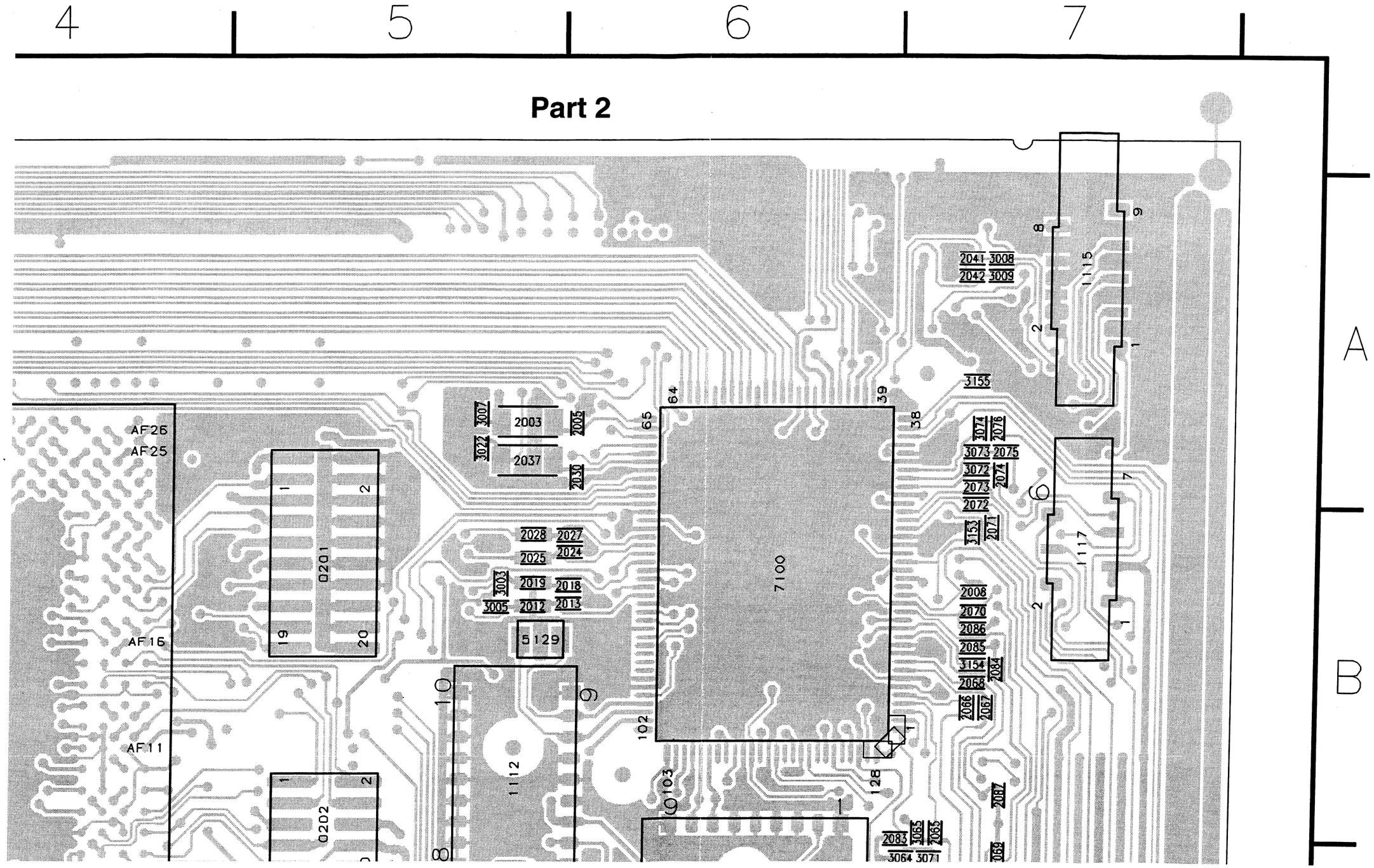
Layout SSB (Part 2 Tuner Side)



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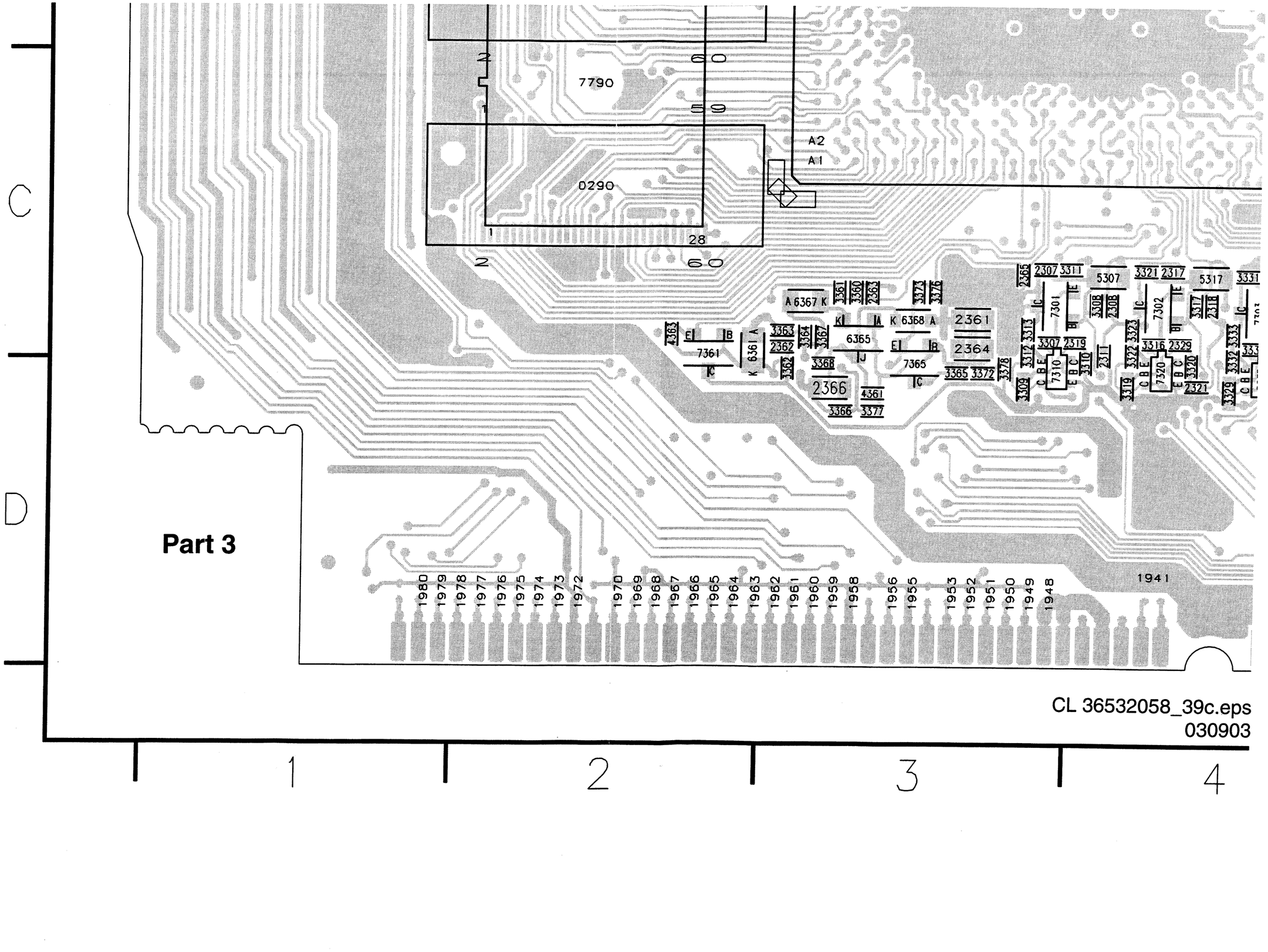
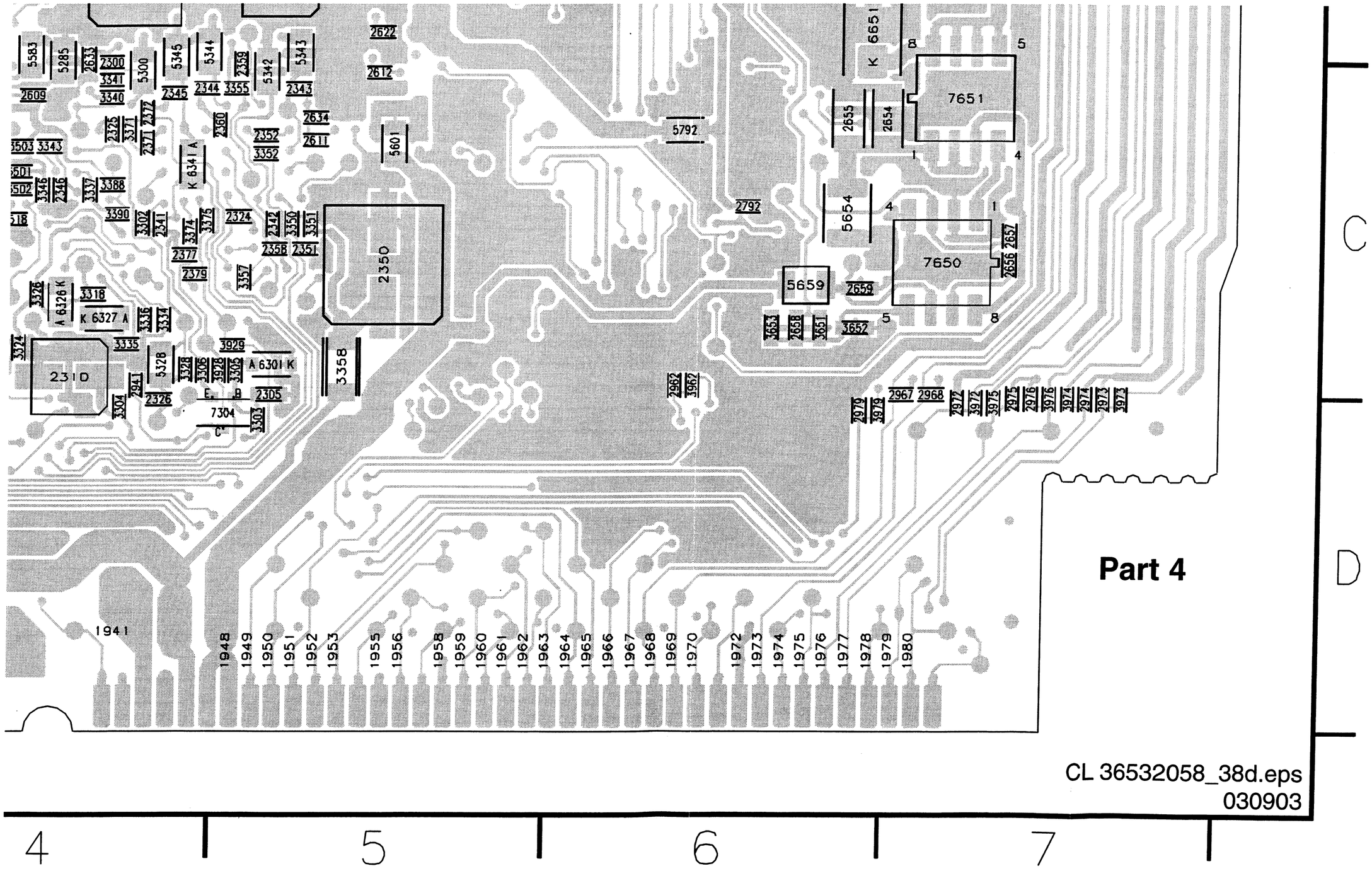
Layout SSB (Part 3 Tuner Side)

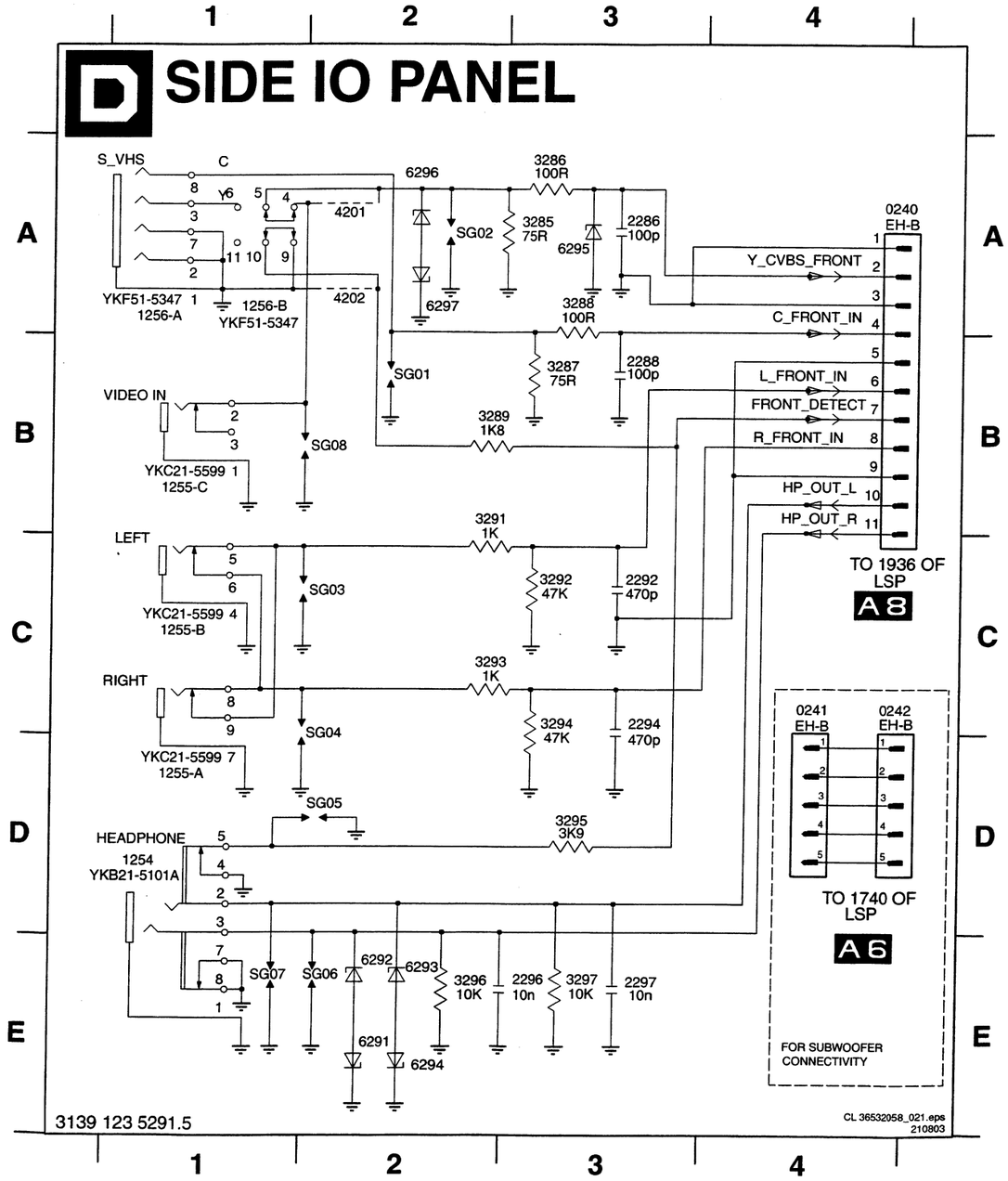


Layout SSB (Part 4 Tuner Side)



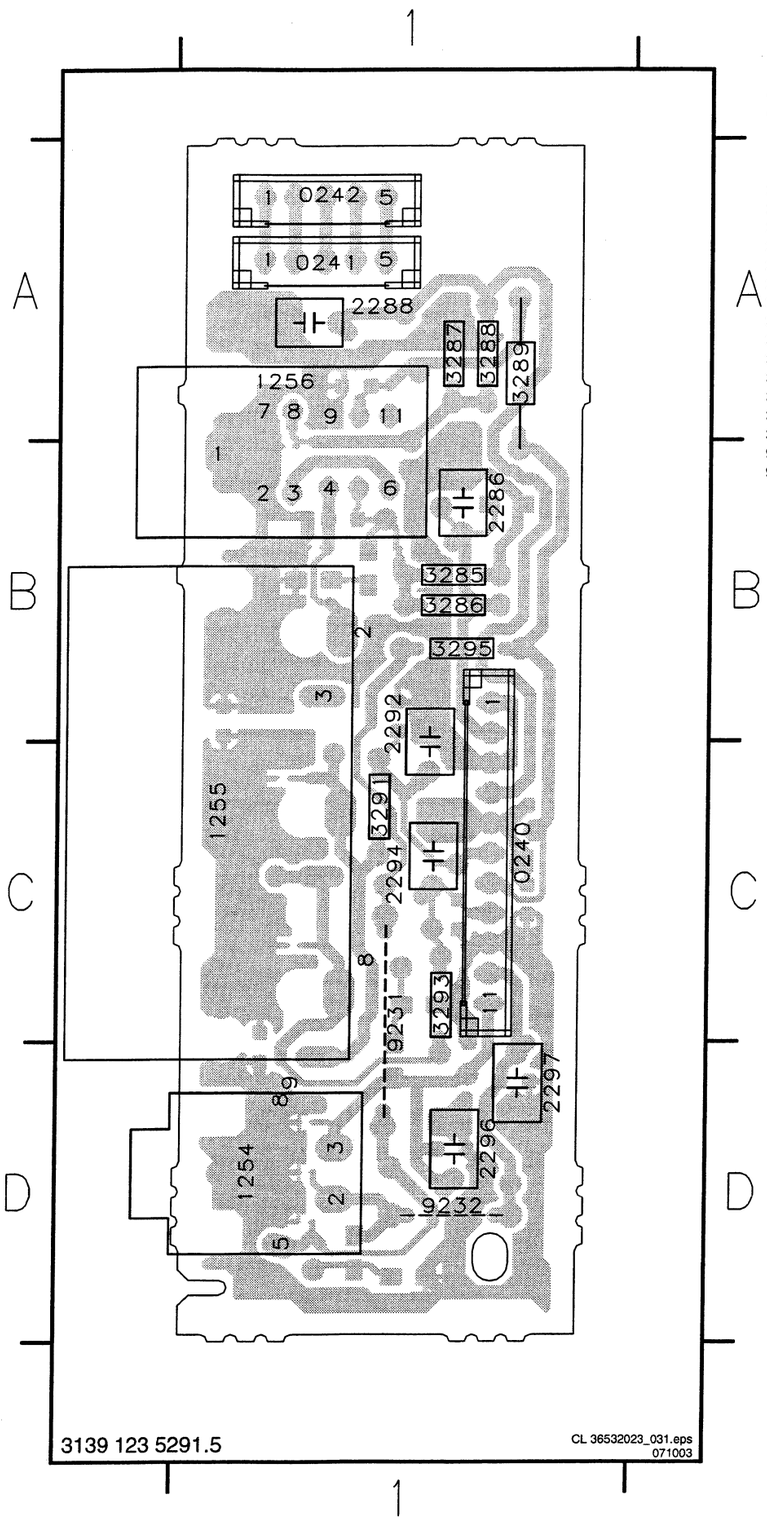
Side I/O Panel

0240 A4	1256-A A1	2297 E3	3292 C3	4202 A2	6297 A2
0241 C4	1256-B A1	3285 A3	3293 C2	6291 E2	
0242 C4	2286 A3	3286 A3	3294 C3	6292 E2	
1254 D1	2288 B3	3287 B3	3295 D3	6293 E2	
1255-A D1	2292 C3	3288 A3	3296 E2	6294 E2	
1255-B C1	2294 C3	3289 B2	3297 E3	6295 A3	
1255-C B1	2296 E3	3291 B2	4201 A2	6296 A2	

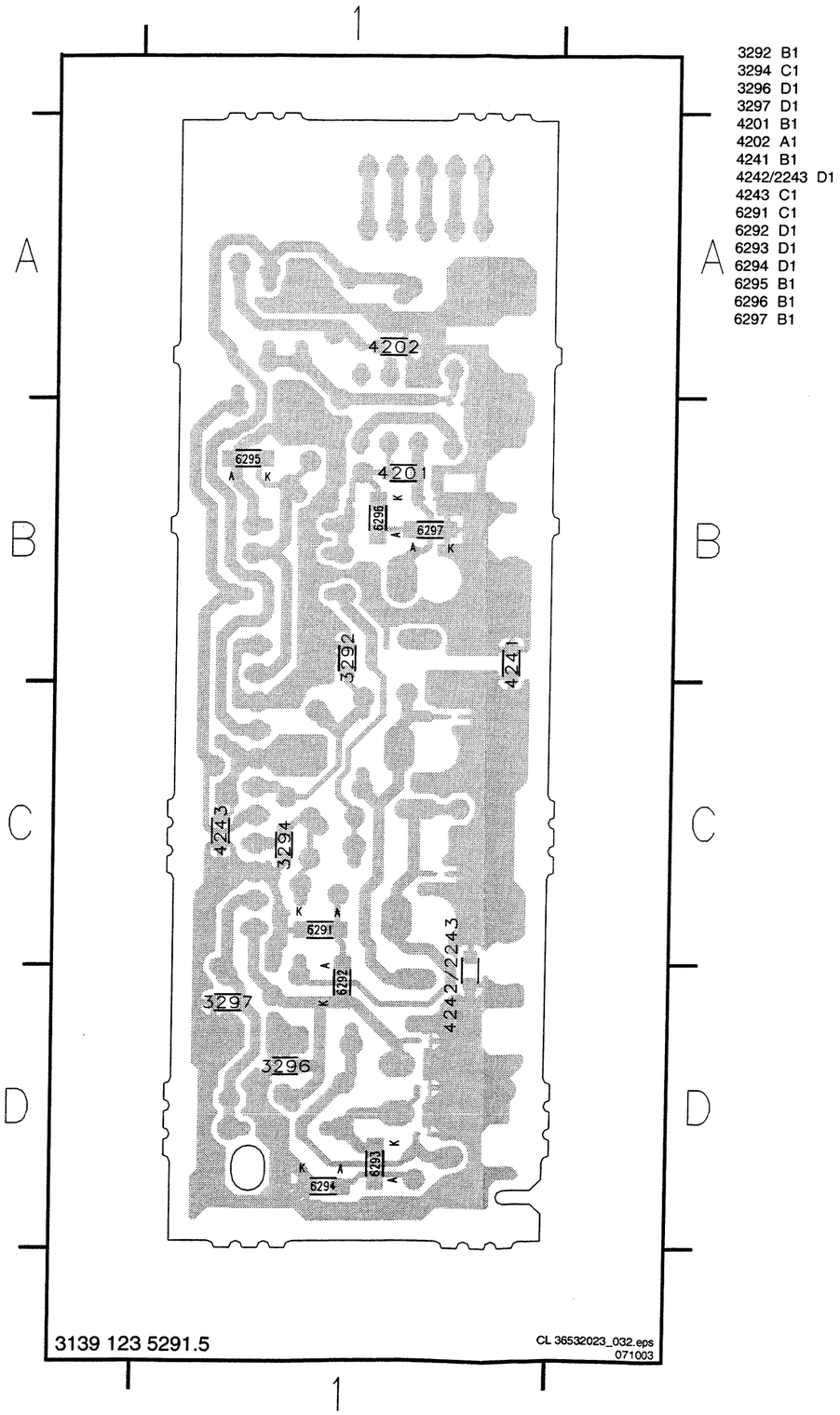


Personal Notes:

Layout Side I/O Panel (Top Side)

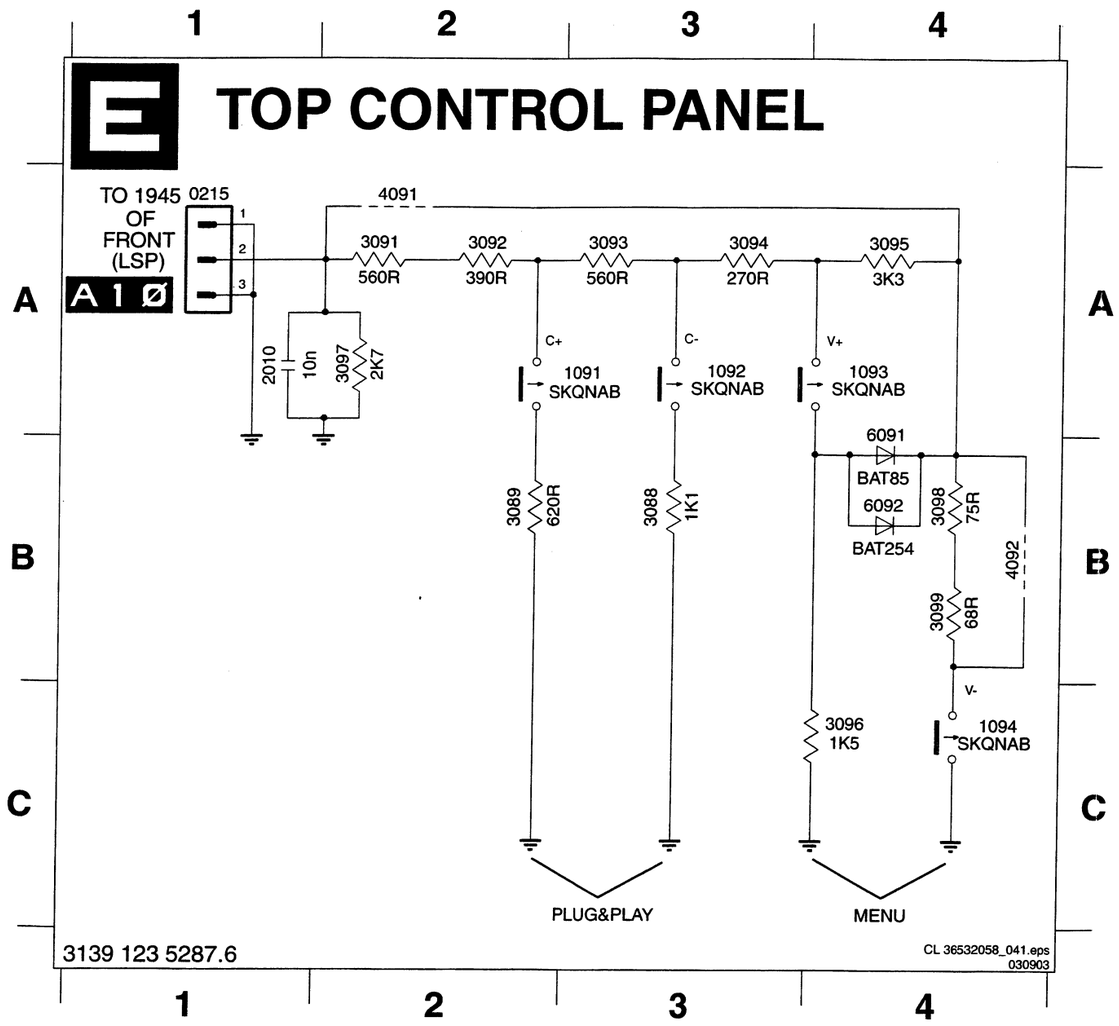


Layout Side I/O Panel (Bottom Side)



Top Control Panel

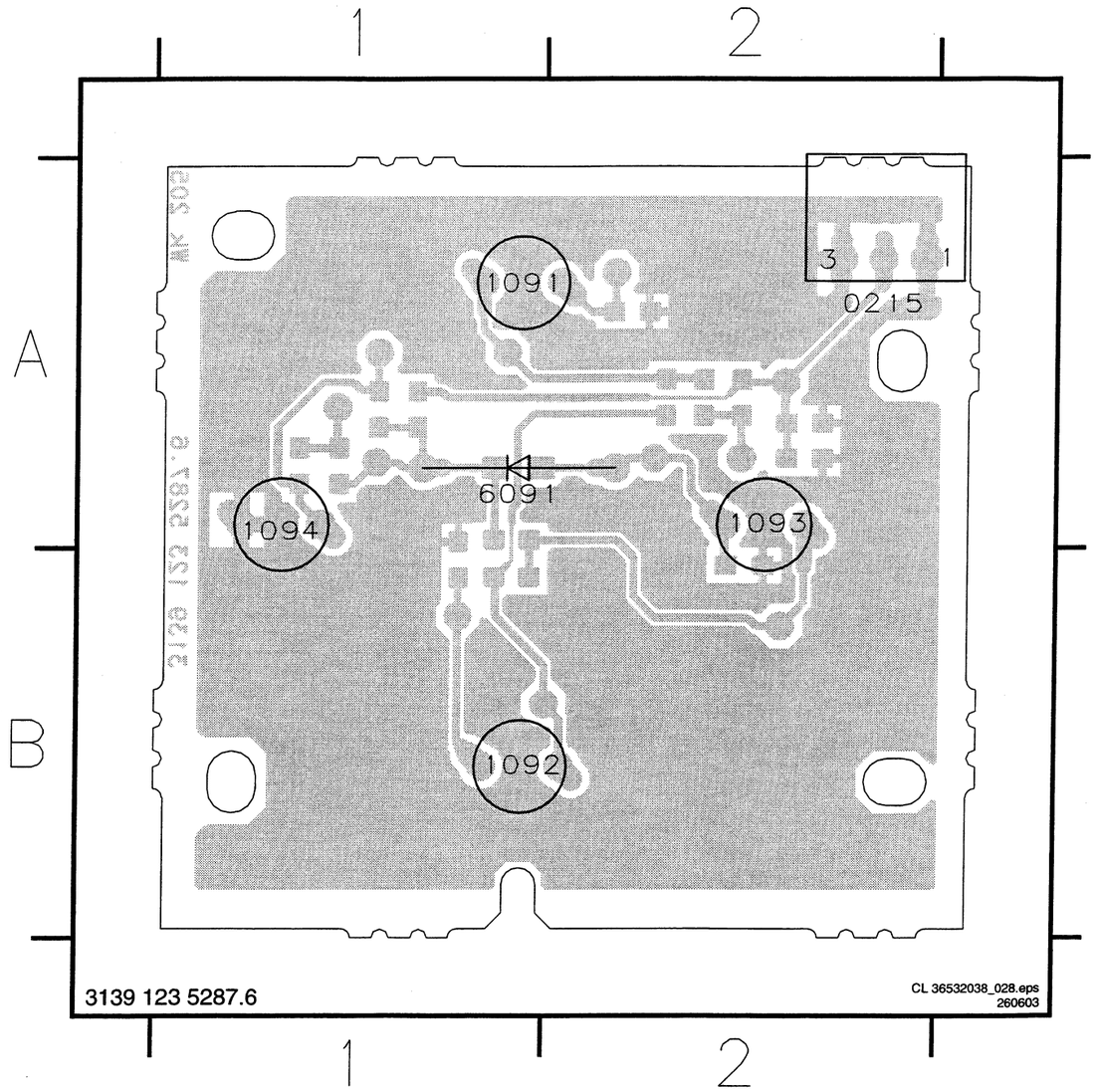
0215 A1 1092 A3 1094 C4 3088 B3 3091 A2 3093 A3 3095 A4 3097 A2 3099 B4 4092 B4 6092 B4
1091 A3 1093 A4 2010 A1 3089 B2 3092 A2 3094 A3 3096 C4 3098 B4 4091 A2 6091 B4



Personal Notes:

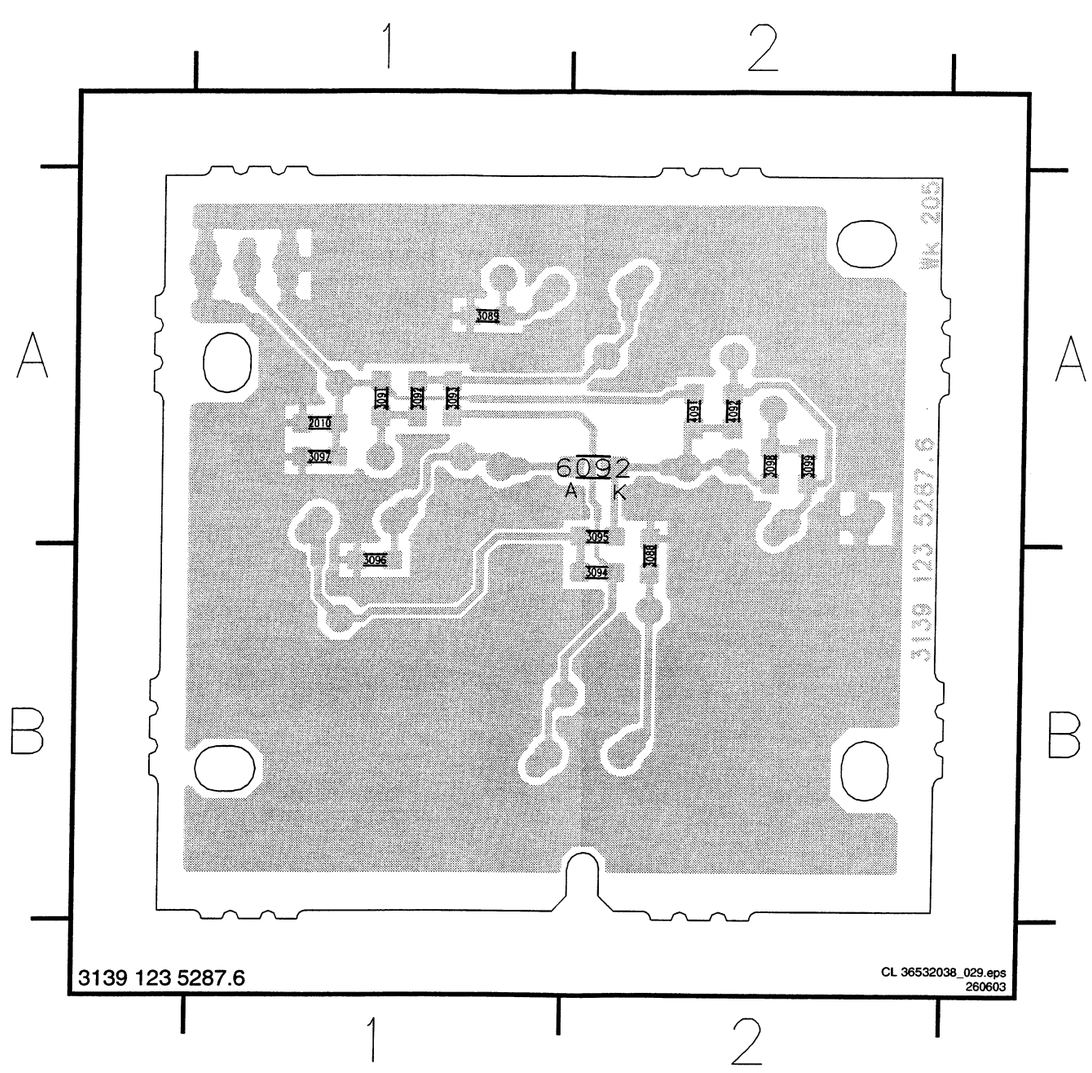
Layout Top Control Panel (Top Side)

0215 A2 1091 A1 1092 B1 1093 A2 1094 A1 6091 A1



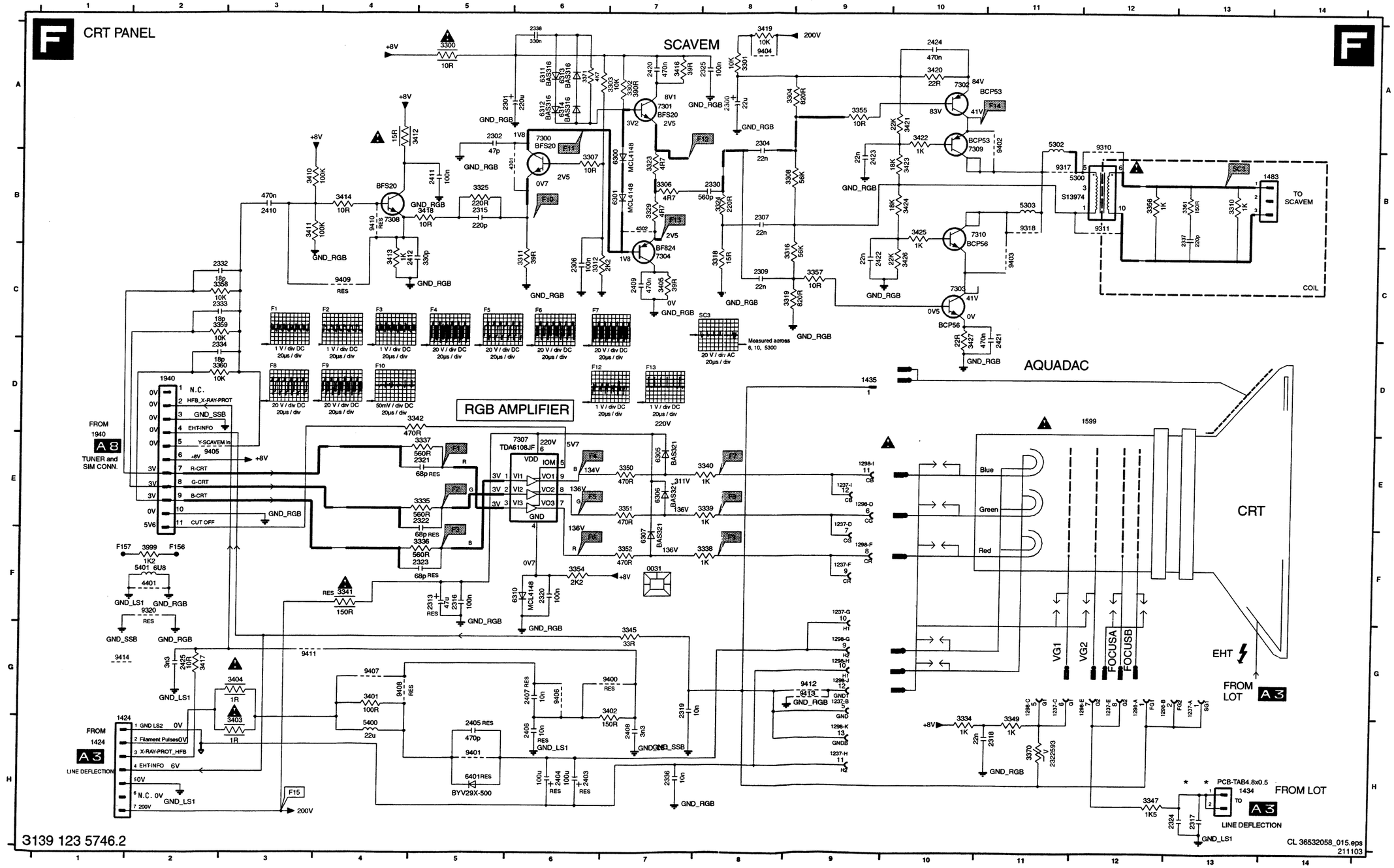
Layout Top Control Panel (Bottom Side)

2010 A1 3088 B2 3089 A1 3091 A1 3092 A1 3093 A1 3094 B2 3095 A2 3096 B1 3097 A1 3098 A2 3099 A2 4091 A2 4092 A2 6092 A2

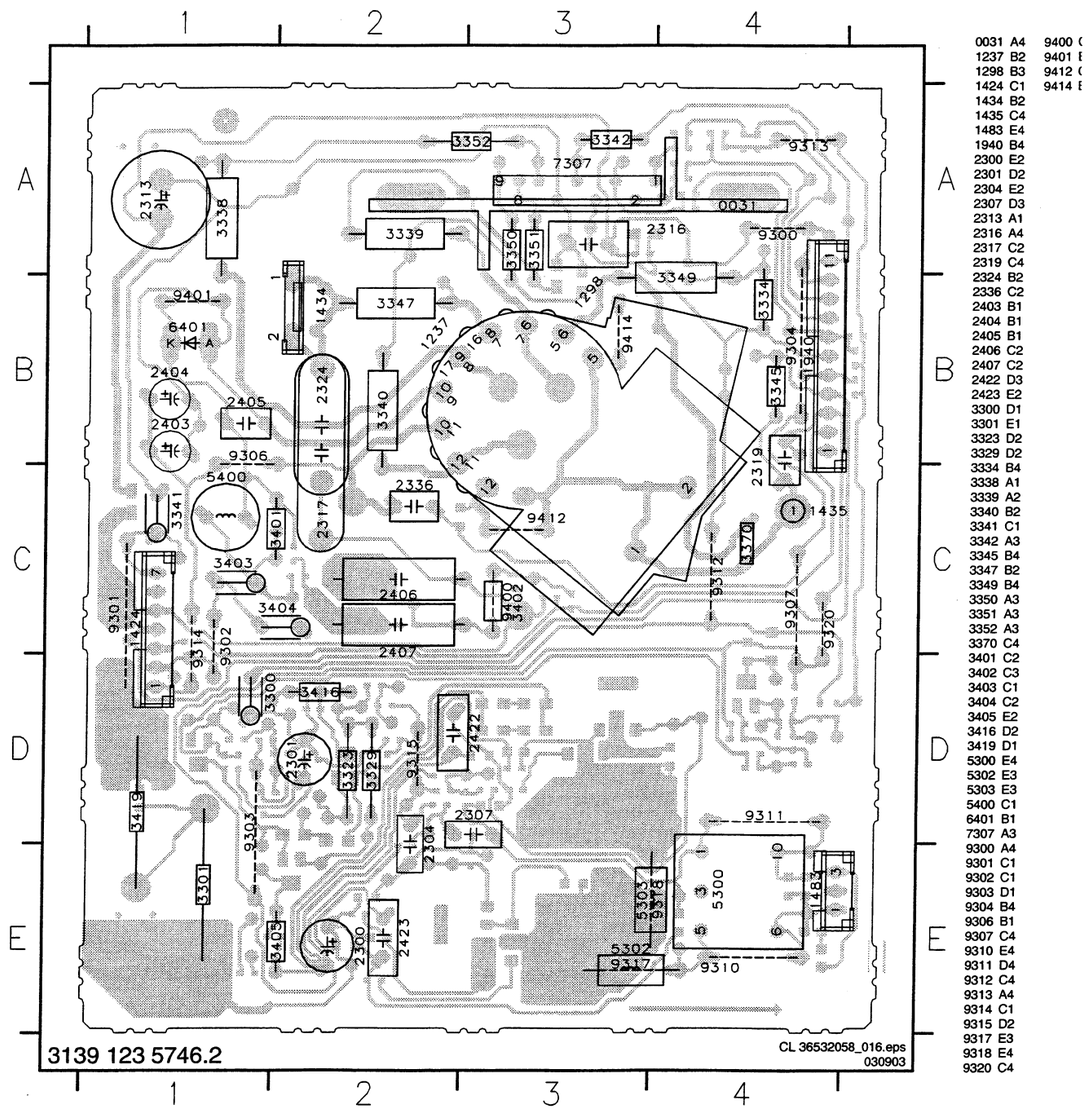


CRT Panel

0031 F7	1298-B G12	1434 H13	2313 F5	2325 A8	2406 H6	2424 A10	3311 C6	3336 F5	3351 E7	3371 A6	3416 A7	3427 D10	6301 B7	7301 A7	9318 B11	9409 C4
1237-A G13	1298-C G11	1435 D9	2315 B5	2330 B8	2407 G6	2425 G2	3312 C6	3337 E5	3352 F7	3401 G4	3417 G2	3999 F2	6305 E7	7302 A10	9320 F2	9410 B4
1237-B G9	1298-D E9	1483 B13	2316 F5	2332 C2	2408 H7	3300 A5	3316 C8	3338 F8	3354 F6	3402 G7	3418 B5	4301 B5	6306 E7	7303 C10	9400 G7	9411 G3
1237-C G11	1298-E G12	1940 D2	2317 H13	2333 C2	2409 C7	3301 A8	3318 C8	3339 E8	3355 A9	3403 H3	3419 A8	4302 B7	6307 F7	7304 C7	9401 H5	9412 G9
1237-D E9	1298-F F9	2300 A8	2318 H11	2334 D2	2410 B3	3302 A7	3319 C8	3340 E8	3356 B12	3404 G3	3420 A10	4401 F2	6310 F6	7307 E6	9402 A11	9413 G9
1237-E G12	1298-G G9	2301 A5	2319 G7	2336 H7	2411 B5	3303 A7	3323 B7	3341 F4	3357 C9	3405 C7	3421 A10	5300 B11	6311 A6	7308 B4	9403 C11	9414 G1
1237-F F9	1298-H G9	2302 A5	2320 F6	2337 B13	2412 C4	3304 A8	3324 B8	3342 D5	3358 C2	3410 B3	3422 A10	5302 A11	6312 A6	7309 A10	9404 A8	
1237-G F9	1298-I E9	2304 A8	2321 E5	2338 A6	2420 A7	3306 B7	3325 B5	3345 G7	3359 C2	3411 B3	3423 B10	5303 B11	6313 A6	7310 B10	9405 E2	
1237-H H9	1298-J G9	2306 C6	2322 E5	2403 H6	2421 D11	3307 B6	3329 B7	3347 H12	3360 D2	3412 A4	3424 B10	5400 H4	6314 A6	9310 A12	9406 G6	
1237-I E9	1298-K H9	2307 B8	2323 F5	2404 H6	2422 C9	3308 B8	3334 H10	3349 H11	3361 B13	3413 C4	3425 B10	5401 F2	6401 H5	9311 B12	9407 G4	
1298-A G12	1424 H2	2309 C8	2324 H13	2405 H5	2423 B9	3310 B13	3335 E5	3350 E7	3370 H11	3414 B4	3426 C10	6300 B7	7300 A6	9317 B11	9408 G4	

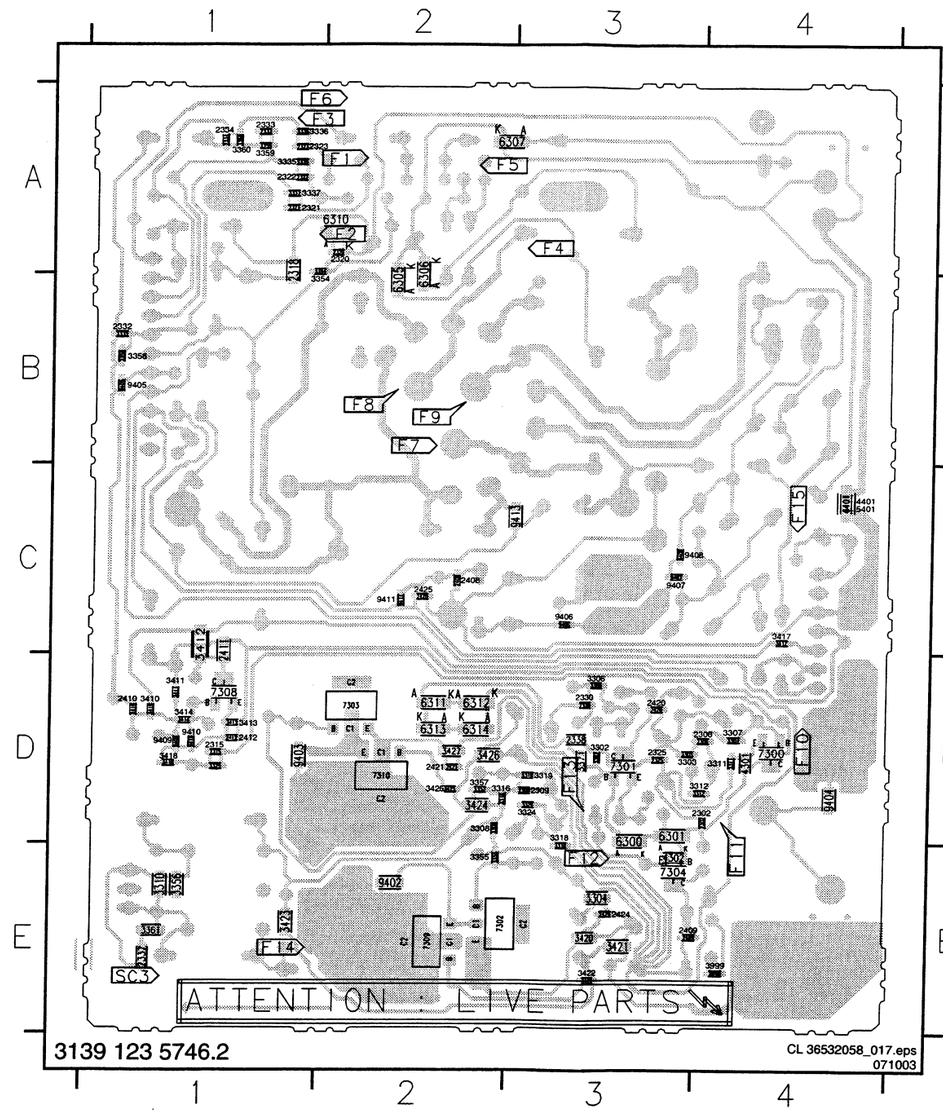


Layout CRT Panel (Top Side)



0031 A4
1237 B2
1298 B3
1424 C1
1434 B2
1435 C4
1483 E4
1940 B4
2300 E2
2301 D2
2304 E2
2307 D3
2313 A1
2316 A4
2317 C2
2319 C4
2324 B2
2336 C2
2403 B1
2404 B1
2405 B1
2406 C2
2407 C2
2422 D3
2423 E2
3300 D1
3301 E1
3323 D2
3329 D2
3334 B4
3338 A1
3339 A2
3340 B2
3341 C1
3342 A3
3345 B4
3347 B2
3349 B4
3350 A3
3351 A3
3352 A3
3370 C4
3401 C2
3402 C3
3403 C1
3404 C2
3405 E2
3416 D2
3419 D1
5300 E4
5302 E3
5303 E3
5400 C1
6401 B1
7307 A3
9300 A4
9301 C1
9302 C1
9303 D1
9304 B4
9306 B1
9307 C4
9310 E4
9311 D4
9312 C4
9313 A4
9314 C1
9315 D2
9317 E3
9318 E4
9320 C4
9400 (
9401 E
9412 (
9414 E

Layout CRT Panel (Bottom Side)



2302 D4
2306 D4
2309 D3
2315 D1
2318 A1
2320 A2
2321 A1
2322 A1
2323 A1
2325 D3
2330 D3
2332 B1
2333 A1
2334 A1
2337 E1
2338 D3
2408 C2
2409 E3
2410 D1
2411 C1
2412 D1
2420 D3
2421 D2
2424 E3
2425 C2
3302 D3
3303 D3
3304 E3
3306 D3
3307 D4
3308 D2
3310 E1
3311 D4
3312 D4
3316 D2
3318 E3
3319 D3
3324 D3
3325 D1
3335 A1
3336 A1
3337 A1
3354 A1
3355 E2
3356 E1
3357 D2
3358 B1
3359 A1
3360 A1
3361 E1
3371 D3
3410 D1
3411 D1
3412 C1
3413 D1
3414 D1
3417 C4
3418 D1
3420 E3
3421 E3
3422 E3
3423 E1
3424 D2
3425 D2
3426 D2
3427 D2
3999 E4
4301 D4
4302 E3
4401 C4
5401
6300
6301
6305
6306
6307
6310
6311
6312
6313
7300
7301
7302
7303
7304
7305
7306
7307
7308
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7310
9300
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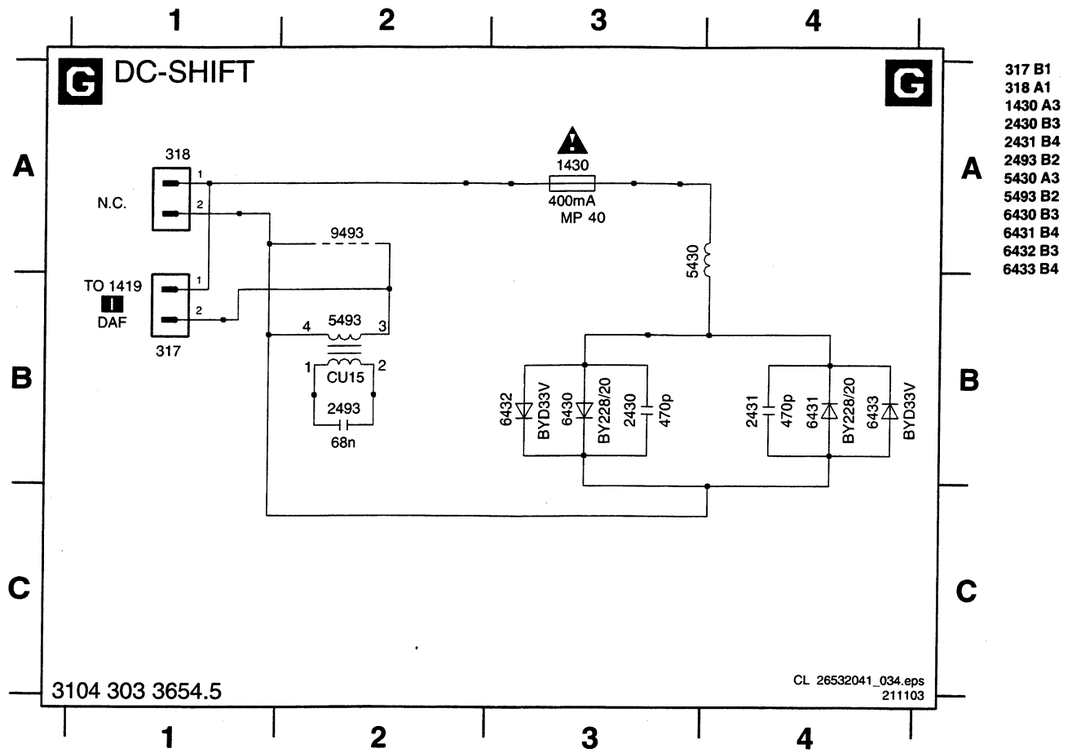
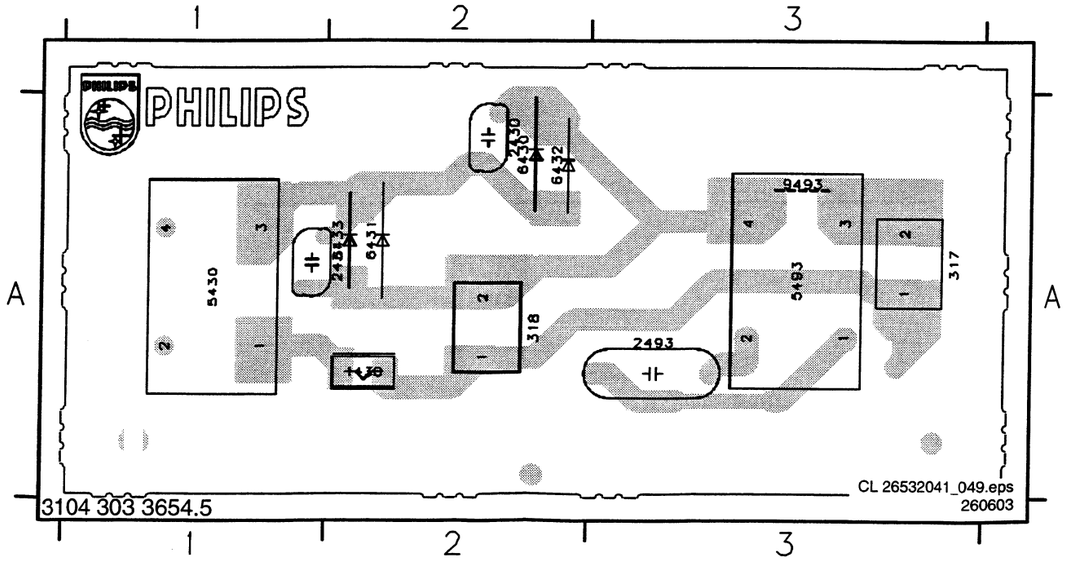
9313

DC Shift Panel



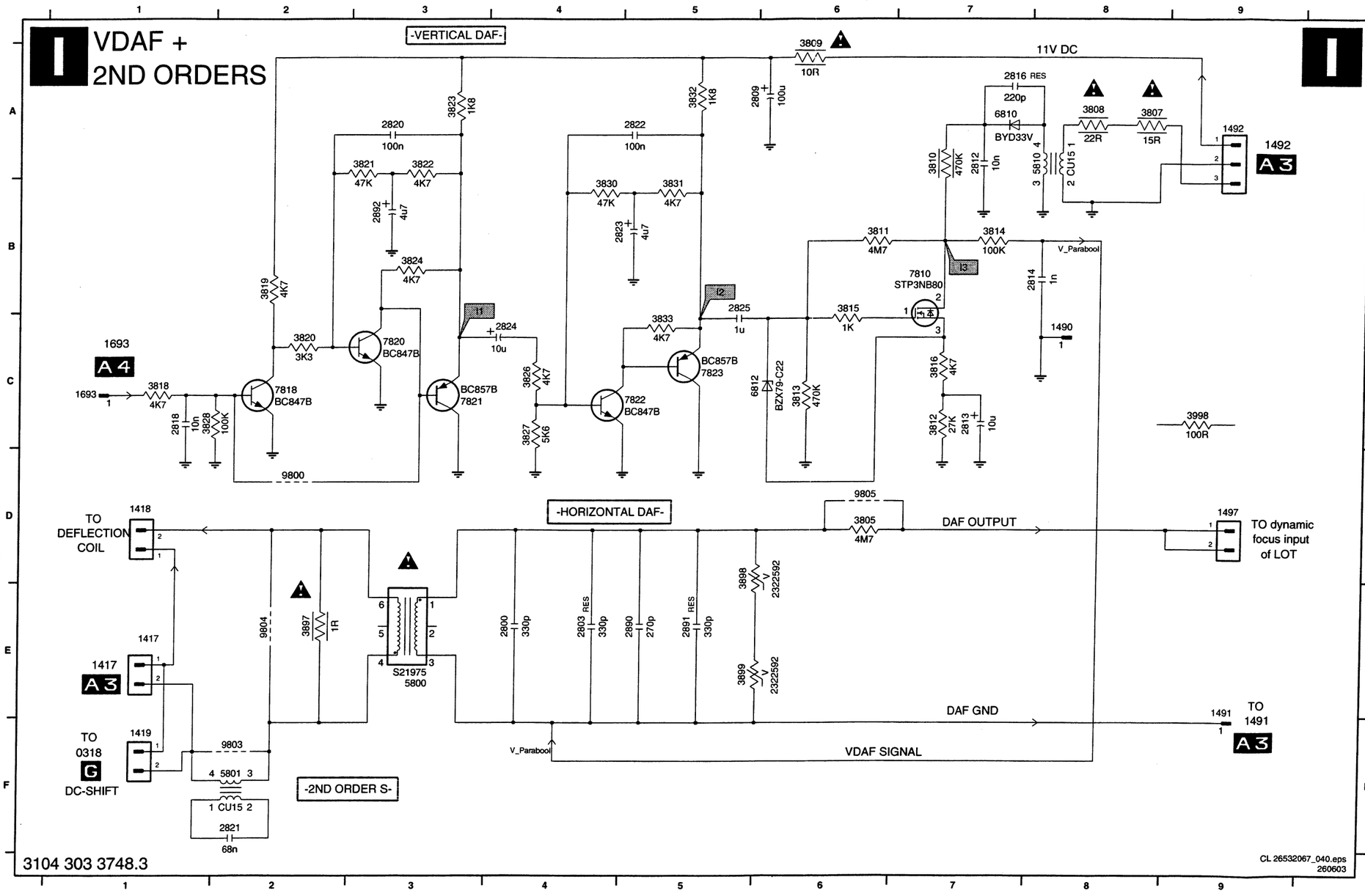
Layout DC Shift Panel

317 A3	2430 A2	5430 A1	6431 A2	9493 A3
318 A2	2431 A1	5493 A3	6432 A2	
1430 A2	2493 A3	6430 A2	6433 A2	



Personal Notes:

VDAF Panel + 2nd Orders

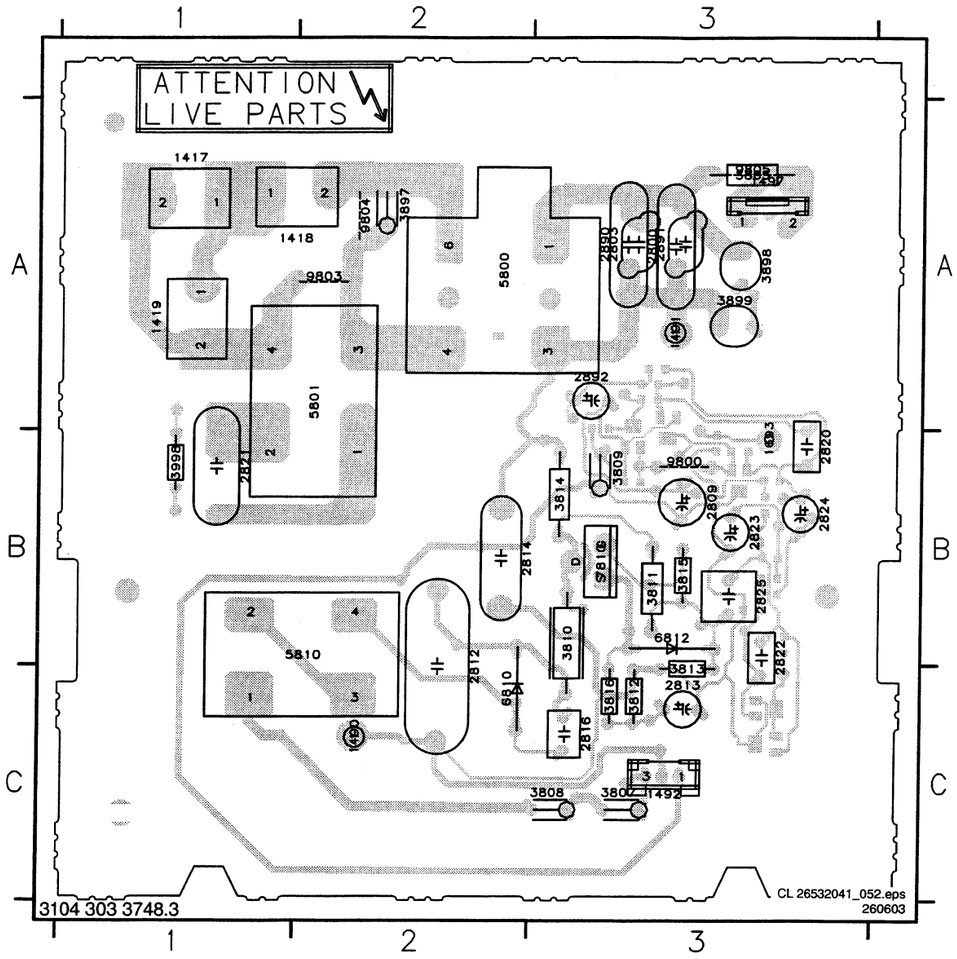


1417 E1 7818 C2
1418 D1 7820 C3
1419 F1 7821 C3
1490 C8 7822 C5
1491 E9 7823 C5
1492 A9 9800 D2
1497 D9 9803 F2
1693 C1 9804 E2
2800 E4 9805 D6
2803 E4
2809 A5
2812 A7
2813 C7
2814 B8
2816 A7
2818 C1
2820 A3
2821 F2
2822 A5
2823 B4
2824 C4
2825 B5
2890 E5
2891 E5
2892 B3
3805 D6
3807 A8
3808 A8
3809 A6
3810 A7
3811 B6
3812 C7
3813 C6
3814 B7
3815 B6
3816 C7
3818 C1
3819 B2
3820 C2
3821 A3
3822 A3
3823 A3
3824 B3
3826 C4
3827 C4
3828 C1
3830 B4
3831 B5
3832 A5
3833 C5
3897 E2
3898 D5
3899 E5
3998 C9
5800 E3
5801 F2
5810 A8
6810 A7
6812 C6
7810 B7

I VDAF+2ND ORDER S

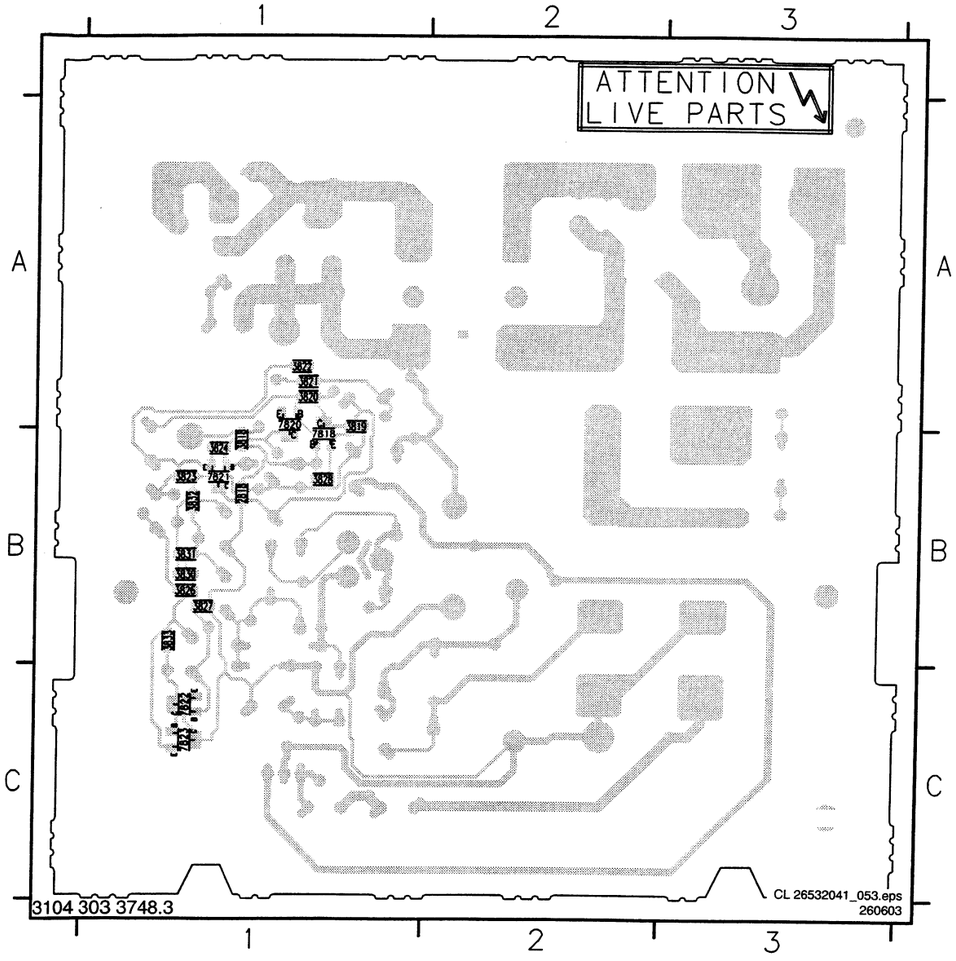
Item	29RF	28RF/32RF	34RF/38RF	38RF	Description
1492	X		X	X	3p
1693	X		X	X	1p
2800	X				330pF
2800		X	X		470pF
2800				X	390pF
2809	X		X	X	100□F
2812	X		X	X	10nF
2813	X		X	X	10□F
2814	X		X	X	1nF
2821	X	X			68nF
2822	X		X	X	4nF
2824	X		X	X	10□F
2825	X		X	X	1□F
2890	X				270pF
2890		X			220pF
2890			X		470pF
2890				X	390pF
3807	X		X	X	15R
3808	X		X	X	15R
3809	X		X	X	10R
3810	X		X	X	470kR
3811	X		X	X	4.7MR
3812	X		X	X	27kR
3813	X		X	X	470kR
3814	X		X	X	100kR
3815	X		X	X	1kR
3816	X		X		4.7kR
3816				X	2.2kR
3818	X		X	X	33kR
3820	X		X	X	Jumper
3821	X		X	X	Jumper
3822	X		X	X	Jumper
3823	X		X	X	1.5kR
3824	X		X	X	33kR
3826	X		X	X	3.3kR
3827	X		X	X	5.6kR
3828	X		X	X	100kR
3830	X		X	X	47kR
3831	X		X	X	4.7kR
3832	X		X	X	1.8kR
3833	X		X	X	4.7kR
5801	X	X			Transformer
5810	X		X	X	Bridge coil
6810	X		X	X	BYD33V
6812	X		X	X	BZX79-C22
7810	X		X	X	STP3NB80FP
7818	X		X	X	BC847B
7822	X		X	X	BC847B
7823	X		X	X	BC857B
9800	X		X	X	Wire
9803			X	X	Wire

Layout VDAF + 2ND Order Panel (Top Side)



1417	A1
1418	A1
1419	A1
1490	C2
1491	A3
1492	C3
1497	A3
1693	B3
2800	A3
2803	A3
2809	B3
2812	C2
2813	C3
2814	B2
2816	C3
2820	B3
2821	B1
2822	B3
2823	B3
2824	B3
2825	B3
2890	A3
2891	A3
2892	A3
3805	A3
3807	C3
3808	C3
3809	B3
3810	B3
3811	B3
3812	C3
3813	C3
3814	B3
3815	B3
3816	C3
3897	A2
3898	A3
3899	A3
3998	B1
5800	A2
5801	A1
5810	B2
6810	C2
6812	B3
7810	B3
9800	B3
9803	A2
9804	A2
9805	A3

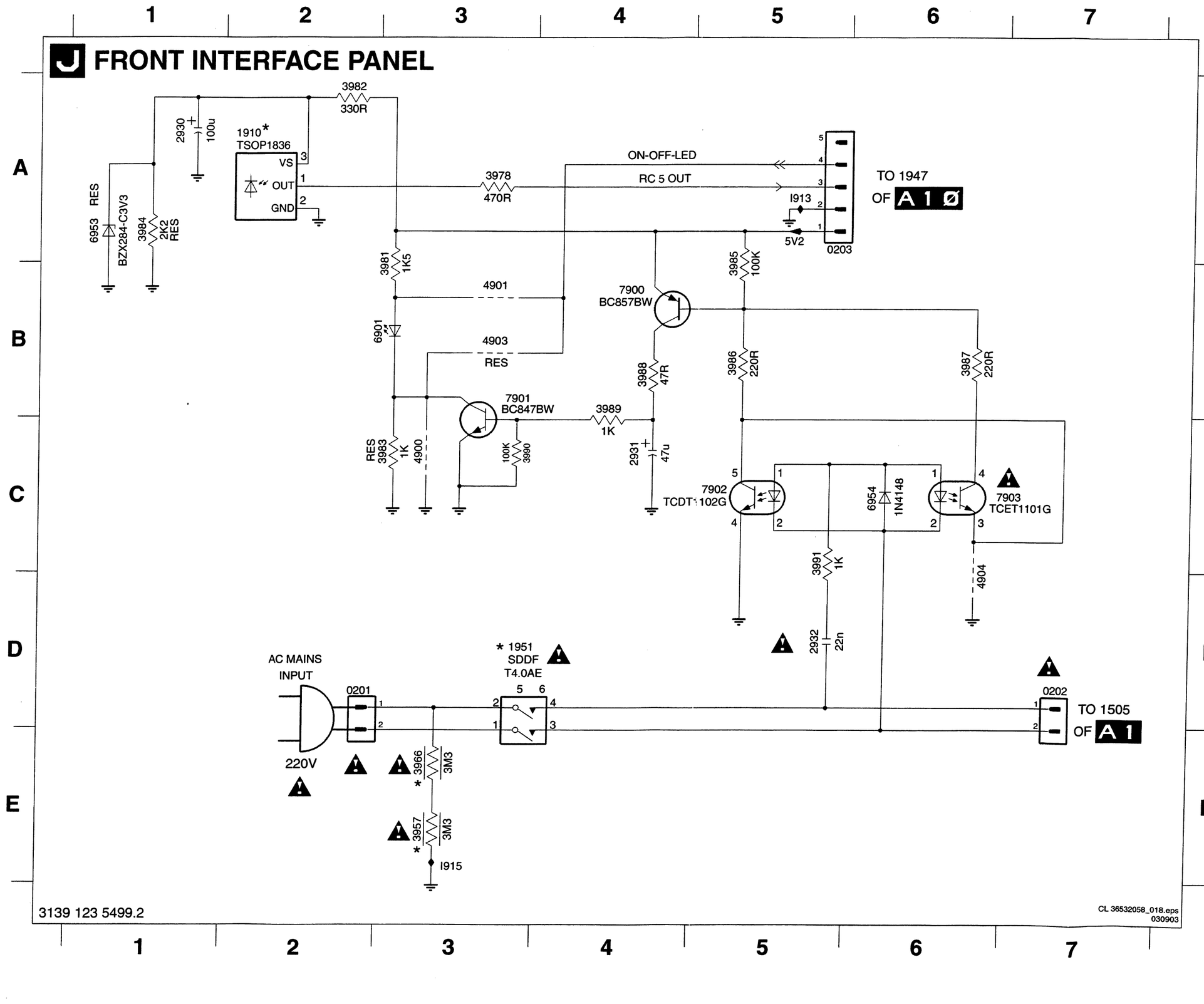
Layout VDAF + 2ND Order Panel (Bottom Side)



2818	B1
3818	B1
3819	A1
3820	A1
3821	A1
3822	A1
3823	B1
3824	B1
3826	B1
3827	B1
3828	B1
3830	B1
3831	B1
3832	B1
3833	B1
7818	B1
7820	A1
7821	B1
7822	C1
7823	C1

Front Interface Panel

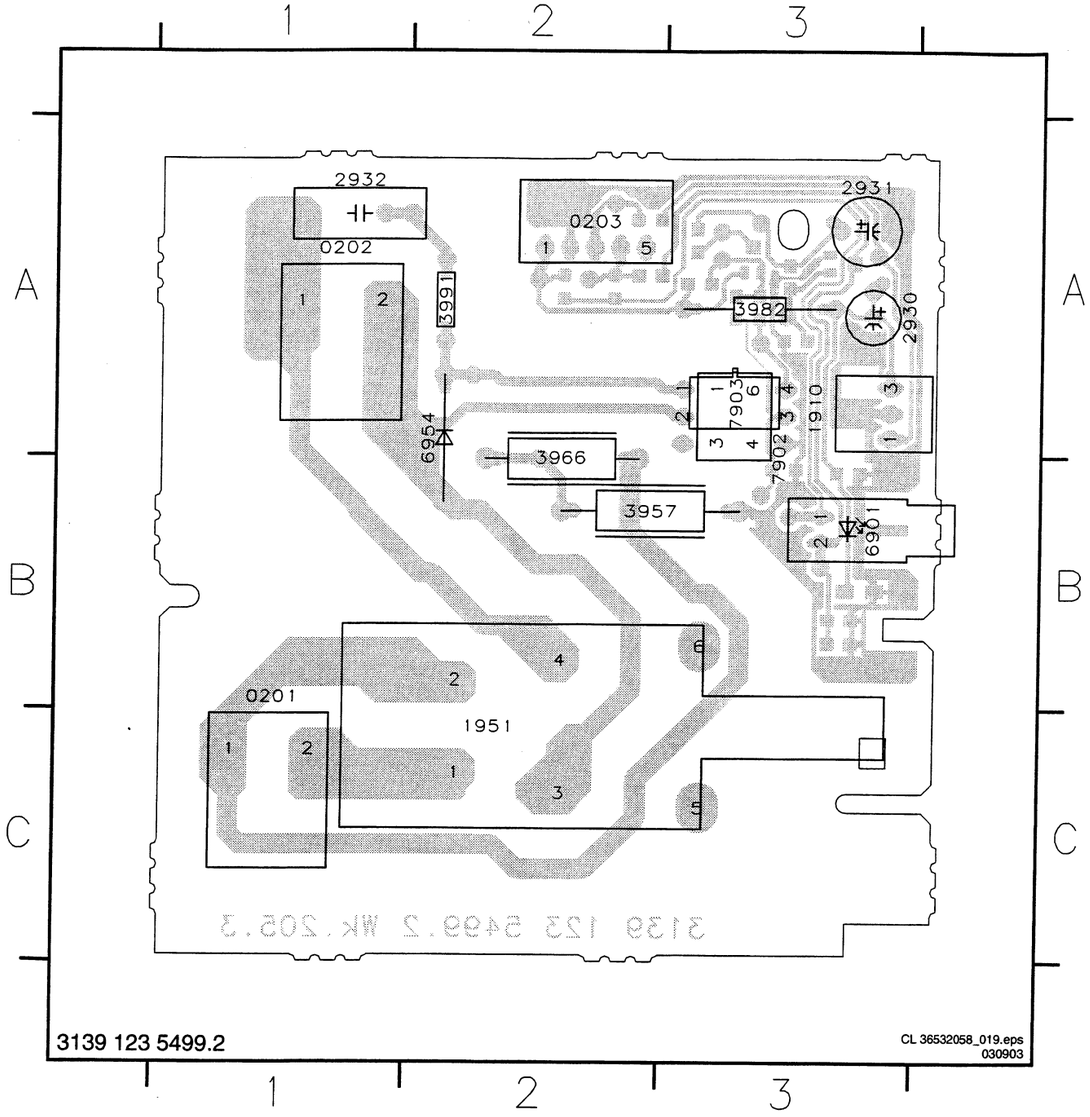
FRONT INTERFACE PANEL



0201 D2
0202 D7
0203 A5
1910 A2
1951 D3
2930 A1
2931 C4
2932 D5
3957 E3
3966 E3
3978 A3
3981 B3
3982 A2
3983 C3
3984 A1
3985 B5
3986 B5
3987 B6
3988 B4
3989 B4
3990 C3
3991 C5
4900 C3
4901 B3
4903 B3
4904 D6
6901 B3
6953 A1
6954 C6
7900 B4
7901 B3
7902 C5
7903 C6

Layout Front Interface Panel (Top Side)

0201 B1 0202 A1 0203 A2 1910 A3 1951 C2 2930 A3 2931 A3 2932 A1 3957 B2 3966 B2 3982 A3 3991 A2 6901 B3 6954 A2 7902 B3 7903 A3



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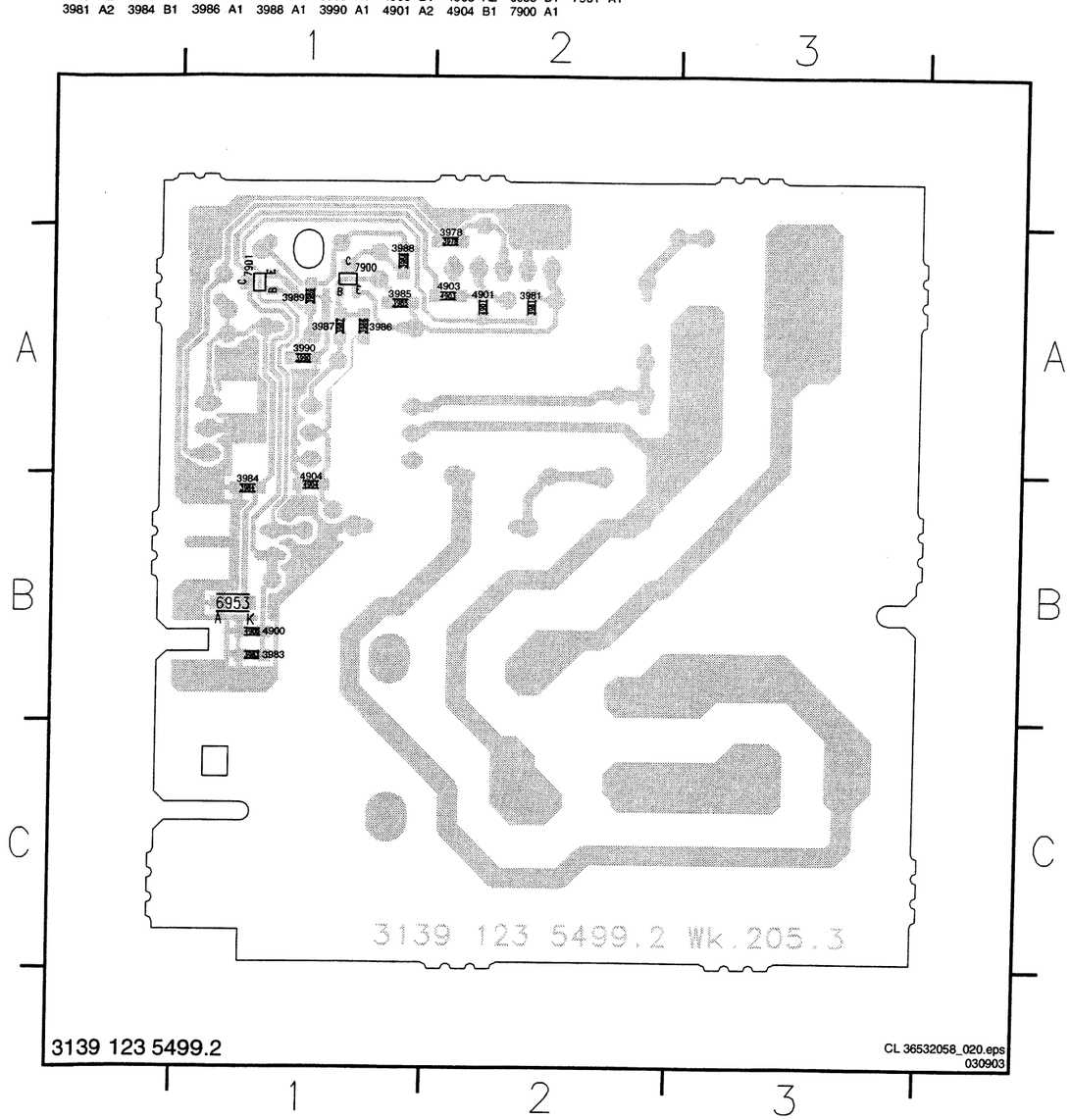
Layout Front Interface Panel (Bottom Side)

3978 A2 3983 B1 3985 A1 3987 A1 3989 A1 4900 B1 4903 A2 6953 B1 7901 A1
3981 A2 3984 B1 3986 A1 3988 A1 3990 A1 4901 A2 4904 B1 7900 A1



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8. Electrical Alignments

Index of this chapter:
1. General alignment conditions
2. Hardware alignments
3. Software alignments
4. Option settings

8.1 General Alignment Conditions

8.1.1 Default Alignment Settings

Perform all electrical adjustments under the following conditions:
- Power supply voltage: 230 V_ac / 50 Hz (± 10 %).
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 20 to 30 minutes.
- Measure voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply).
  Caution: never use heatsinks as ground.
- Test probe: Ri > 10 Mohm, Ci < 20 pF.
- Use an isolated trimmer/screwdriver to perform alignments.

Perform all electrical adjustments with the following default settings (for all CRTs):
- Choose "Natural" picture mode with the "Smart Picture" button on the remote control.
- Set "Dynamic Contrast" and "Active Control" to "off" (if either one of them is present).
- Set "Brightness" to aligned value unless otherwise specified.

8.1.2 Adjustment Sequence

Use the following adjustment sequence:
1. Set the correct TV-set OPTIONS as described in paragraph "Options". After storing, re-start the set.
2. Rough adjustment of VG2 and FOCUS.
3. RF-AGC alignment.
4. IF-PLL OFFSET adjustment.
5. Rough adjustment of GEOMETRY.
6. Allow the set to warm up.
7. Precise adjustment of VG2 and FOCUS.
8. Precise adjustment of GEOMETRY.
9. PIP alignments (if present).
10. COLOUR alignments.
11. Other software alignments.

8.2 Hardware Alignments

Notes:
- The Service Alignment Mode (SAM) is described in chapter 5 "Service Modes, Error Codes, and Fault Finding".
- Use the cursor-, menu-, and OK-buttons of the remote control (RC) transmitter for navigation.

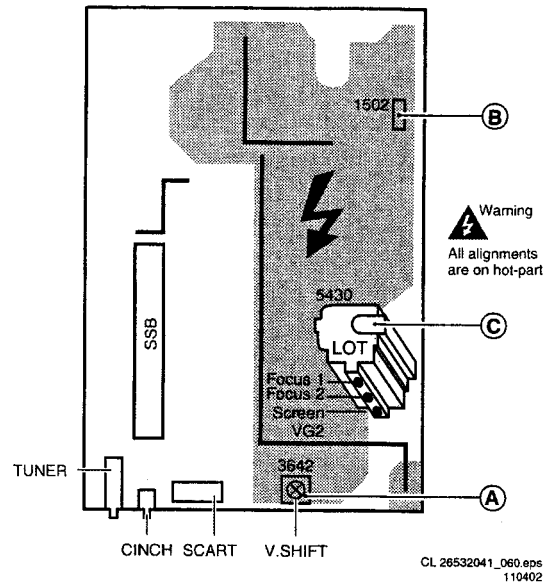

Figure 8-1 Top view LSP

8.2.1 Vg2 Adjustment

Notes:
- For adjusting the VG2 in A10 sets, the vertical scan could be disabled by the VSD bit (Vertical Scan Disable). However, do **not** use this option in this chassis, as it will lead to a "beam current" protection!
- Also, the option "VG2" in the SAM does not function yet. Please, do **not** use!

In the frame-blanking period of the R, G, and B signals applied to the CRT, the video processor inserts a measuring pulse with different DC levels. Measure the black level pulse during the vertical flyback at the RGB cathodes of the CRT.
1. Connect the RF output of a pattern generator to the antenna input. Input a "black" picture (blank screen on CRT without any OSD info) test pattern.
2. Use the MENU key to enter the "user" menu, select "Picture", and set "Brightness" and "Contrast" to minimum.
3. Set the oscilloscope to 20 V/div and the time base to 20 us/div. Use external triggering on the vertical pulse.
   Caution: use a trigger point on the "**cold**" side!
4. Ground the scope on the CRT panel ("**cold**" side) and connect a 10:1 probe to one of the cathodes of the picture tube socket (see circuit diagram F).
5. Measure at test points F017, F018 and F019 on the picture tube socket the DC-level of the measuring pulse (1st full line after the frame blanking) with respect to earth.
6. Select the pin with the highest level found and adjust V_cutoff by means of the Vg2-potmeter (lowest-one) on the Line Output Transformer (LOT) to 165 +/- 5 V_dc (for all screen sizes).
7. Reset "Contrast" and "Brightness" to their original values.

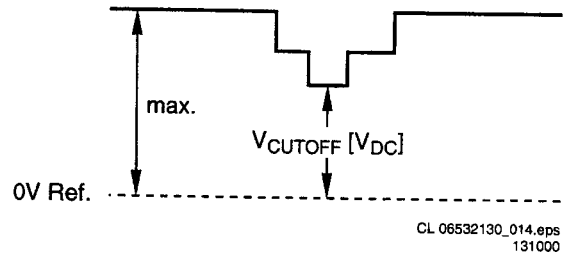

Figure 8-2 Waveform Vg2 alignment

8.2.2 Focus alignment

The LOT has the following outline:
- Focus 1 (F1) = Static alignment (black wire).
- Focus 2 (F2) = Dynamic alignment (red wire).

1. Use an external video pattern generator to input a "circle" or "crosshatch" test pattern to the set.
2. Choose "Natural" picture mode with the "Smart Picture" button on the remote control transmitter.
3. Adjust the "dynamic focus 2" potentiometer (in the middle on the LOT) until the horizontal lines at the centre of the screen are of minimum width without introducing a visible haze.
4. Adjust the "static focus 1" potentiometer (highest of the LOT) until the horizontal lines at the sides of the screen are of minimum width without introducing a visible haze.
5. Repeat these two steps to achieve the best result.

8.3 Software Alignments

Put the set in the SAM (see the "Service Modes, Error Codes and Fault Finding" section). The SAM menu will now appear on the screen. The different alignment parameters are described further on.

Notes:
- All changes to menu items and alignments must be stored manually.
- If an empty EAROM (permanent memory) is detected, all settings are set to pre-programmed default values, so the set must be re-aligned.

8.3.1 TUNER

AGC
1. Set an external pattern generator to a colour bar video signal and connect the RF output to the aerial input of the TV. Set the amplitude to 10 mV and the frequency to 475.25 MHz. Use system PAL B/G if possible, otherwise match the system of your generator with the received signal in the set.
2. Put the set in the SAM mode.
3. Select via the TUNER menu, the AGC sub-menu.
4. Connect a DC multi-meter to pin 1 of the tuner (item 1200 on the LSP).
5. Adjust the AGC until the voltage at pin 1 of the tuner is 3.3 V (+/- 0.1 V). The value can be incremented or decremented by pressing the right/left CURSOR button on the RC.
6. After alignment, save the value(s) with the STORE command in the SAM main menu.

IF PLL OFFSET
No adjustments needed: default value is "35".

If the mentioned default value does not give the required result, use the following alignment method:

1. Set an external pattern generator to a crosshatch video signal and connect the RF output to the aerial input of the TV. Set the amplitude to 10 mV and the frequency to 475.25 MHz. Use system PAL B/G if possible, otherwise match the system of your generator with the received signal in the set.
   - For "Negative modulation", the **sound** signal must be a non-modulated FM signal.
   - For "Positive modulation", the **video** signal must have high modulation (100% or above).
2. Put the set in the SAM mode.
3. Select via the TUNER menu, the IF-PLL OFFSET sub-menu.
4. Measure and align:
   - For "Negative modulation", on SCART pin 1 or 3 (**audio** out): Adjust IF-PLL OFFSET until the largest Signal Noise Ratio (SNR) is reached.
   - For "Positive modulation", on SCART pin 19 (**video** out): Adjust IF-PLL OFFSET until you get minimal V-sync disturbance.

8.3.2 GEOMETRY

Notes:
- Set an **external** pattern generator to a crosshatch video signal and connect the RF output to the aerial input of the TV. Set the amplitude at least 1 mV_rms (60 dBuV) and the frequency to 475.25 MHz. Use system PAL B/G if possible, otherwise match the system of your generator with the received signal in the set.
  Note: Do **not** use the internal test pattern from the GEOMETRY menu!
- Use the default alignment settings, but set "Brightness" to "32".
- For wide screen models, set to "wide screen" mode, for "classic" models, set to "4:3".
- After alignment, save the value(s) with the STORE command in the SAM main menu.

Service tip: When the set is equipped with a rotation coil, use this menu item to check its correct alignment. If alignment is not correct, go to the user MENU, choose FEATURES, and select ROTATION. With the use of a crosshatch test pattern, align it to a correct horizontal picture.

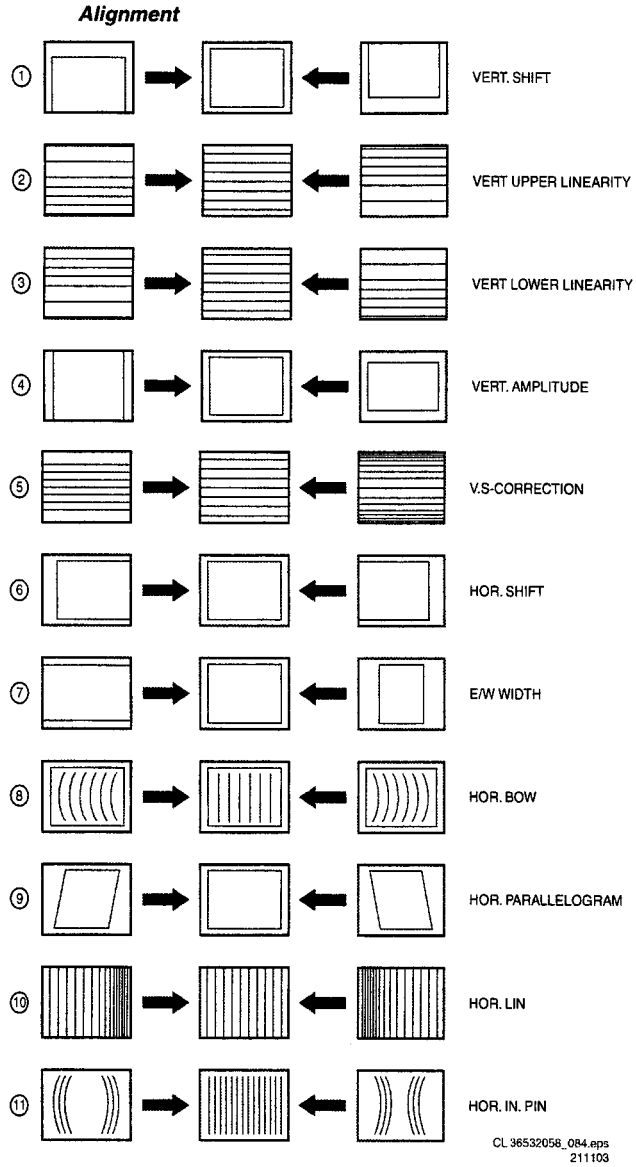

Figure 8-3 Geometry Alignments

1. Before starting the vertical alignment, set (in SAM) the following parameters to "0":
   - VER. SHIFT,
   - VER. SCOR,
   - VER. U_LIN,
   - VER. L_LIN.
2. Set SERV. BLK to "on", to blank the lower half of the screen.
3. Adjust the "VERTICAL SHIFT" potentiometer (R3642 on the LSP) until the picture is centred (to the mechanical centre of the picture tube), and switch SERV. BLK to "off".
4. Adjust VER. U_LIN and VER. L_LIN such, that upper and lower horizontal lines of the crosshatch pattern are just visible.

Use then the following software regulations to modify the geometry:

1. VER. AMPL (Vertical Amplitude): Align for the vertical picture centre, range from -32 to +32.
2. VER. SHIFT (Vertical Shift): Compensating for any gain error in amplifier, adjust range from -32 to +32 to the proper amplitude.
3. VER. SCOR (Vertical S-Correction): Align for equal height of the blocks in the top, the bottom and the middle, range from -63 to +63.
4. HOR. SHIFT (Horizontal Shift): Adjust for the horizontal centre of the screen, range from -127 to +128.

Next step is to align the East/West geometry.

1. First, set the parameters EW_5 and EW_6 to "0"
2. EW. WIDTH (East-West Width): This sets the (overall) horizontal size of the picture on the screen. Range from -63 to +63 (with the following EW alignments, these lines can be straightened).
3. EW_1 (East-West parameter 1): Has effect on the length of the upper part of the vertical E/W lines.
4. EW_2 (East-West parameter 2): Has effect on the length of the vertical E/W lines just below EW_1.
5. EW_3 (East-West parameter 3): Has effect on the length of the vertical E/W lines just below EW_2.
6. EW_4 (East-West parameter 4): Has effect on the length of the vertical E/W lines just below EW_3.
7. EW_5 (East-West parameter 5): Has effect on the length of the vertical E/W lines just below EW_4.
8. EW_6 (East-West parameter 6): Has effect on the length of the vertical E/W lines just below EW_5.
9. EW_7 (East-West parameter 7): Has effect on the length of the vertical E/W lines just below EW_6.
10. EW_8 (East-West parameter 8): Has effect on the length of the vertical E/W lines just below EW_7.
11. EW_9 (East-West parameter 9): Has effect on the length of the vertical E/W lines just below EW_8.
12. EW_10 (East-West parameters 10): Has effect on the length of the lowest part of the vertical E/W lines.
13. HOR. BOW (Horizontal Bow): Align the EW parabola to be symmetrical, range from -63 to +63.
14. HOR. PARALLEL (Horizontal Parallel): Align for straight vertical lines on the picture sides, range from -63 to +63.
15. HOR. LIN (Horizontal Linearity): Align for equal width of horizontal blocks on the left, the right and the centre, range from 0 to +127.
16. HOR. IN_PIN (Horizontal Inner Pincushion): Align for the inner straight vertical lines, range from 0 to +32.

8.3.3 WHITE TONE

In the WHITE TONE sub menu, the colour values for the different colour temperatures can be changed.
The colour temperature mode (NORMAL, DELTA COOL, DELTA WARM) can be selected per colour (R, G, and B) with the RIGHT/LEFT cursor keys. The mode or value can be changed with the UP/DOWN cursor keys.
First, the values for the NORMAL colour temperature must be selected. Then the offset values for the DELTA COOL and DELTA WARM mode can be selected. Note that the alignment values are non-linear.

Alignment
No adjustments needed. Use the given default values:

Table 8-1 White tone alignment (default values)

Parameter	28PW8609/12	29PT8509/12	32PW8609/12
Normal Red	-4	+11	+1
Normal Green	-9	+4	-7
Normal Blue	-6	+12	-2
Red BL Offset	7		
Green BL Offset	7		
Blue BL Offset	7		
Delta Cool Red	7		
Delta Cool Green	15		
Delta Cool Blue	33		
Delta Warm Red	2		
Delta Warm Green	3		
Delta Warm Blue	7		

If the mentioned default value does not give the required result, use the following alignment method:

1. Set the external pattern generator to a 100% white pattern, and connect the RF output to the aerial input of the TV. Set the amplitude at least 1 mV_rms (60 dBuV) and the frequency to 475.25 MHz. Use system PAL B/G if possible, otherwise match the system of your generator with the received signal in the set.
2. Set "Smart Picture" to "Natural".
3. Set "Dynamic NR" to "off".
4. Put the set in the SAM mode.
5. Select via the WHITE TONE menu, the PATTERN sub-menu.
6. Set PATTERN to "on".
7. Set NORMAL GREEN to "32".
8. Measure with the colour analyser (Minolta CA100 Colour Analyser or equivalent), calibrated with the spectra, on the centre of the screen.
9. Adjust with the cursor left/right command the Red and Blue register for the right xy-coordinates (see the table below).
10. Repeat the white tone adjustment also for the colour temperatures COOL and WARM.

Table 8-2 White tone alignment (with colour analyser)

White D mode	Temperature	DUV	x	y
Normal	8500 K	+-0.004	288 +/- 4	300 +/- 4
Cool	11500 K	+-0.005	273 +/- 5	282 +/- 5
Warm	7000 K	+-0.005	305 +/- 5	312 +/- 5

8.3.4 SOUND

No adjustments needed. Use the given default values:

- PRESCALE LEVEL
  - FM: "+1".
  - NICAM: "+3".
  - EXTAM Gain: "0".
  - PIPMONO: "0".
  - ExtLR-in: "0".
- TRESHOLD LEVEL
  - Over Mod Tresh: "+3dB".
  - NIC ErrLmt_Hi: "60".
  - NIC ErrLmt_Lo: "20".
  - NoiseTres SC2: "+2".
  - NoiseHyst SC2: "+4".
- EFFECTS LEVEL
  - BMT CutOffFrq: "50Hz".
  - Incredible SND: "60%".
  - VDolby: "100%".

8.3.5 SMART SETTINGS

No adjustments needed. Use the given default values:

Table 8-3 Smart settings (default values)

Smart setting		Default
RICH	BGT	55
	COL	55
	CON	100
	SHP	6
	HUE	51
NATURE	BGT	51
	COL	48
	CON	80
	SHP	5
	HUE	51
SOFT	BGT	49
	COL	45
	CON	65
	SHP	4
	HUE	51
MULTI	BGT	51
	COL	48
	CON	85
	SHP	6
	HUE	51
BGT= Brightness, COL= Colour, CON= Contrast, SHP= Sharpness, HUE= Hue (not valid for Europe).		

8.4 Option Settings

8.4.1 Introduction

The microprocessor communicates with a large number of I2C ICs in the set. To ensure good communication and to make digital diagnosis possible, the microprocessor has to know which ICs to address. The presence / absence of these specific ICs (or functions) is made known by the option codes.

Notes:

- After changing the option(s), save them with the STORE command.
- All changes are disregarded when the OPTIONS submenu is left without using the STORE command.
- The new option setting is only active after the TV is switched "off" and "on" again with the Mains switch (the EAROM is then read again).

8.4.2 Changing options

Options are used to control the presence / absence of certain features and hardware. There are two ways to change the option settings. All changes in the option settings are saved by selecting STORE and pressing the CURSOR RIGHT key. Some changes will only take affect after the set has been switched OFF and ON with the mains switch (cold start).

Changing multiple options by changing option byte values
Option Bytes (OB) makes it possible to set all options very fast. An option byte represents a number of different options. All

options are controlled via eight option bytes (OB0 to OB7). Select an Option Byte you want to change with the CURSOR UP/DOWN keys, and key in the new value. See table for more details. An explanation per option is listed in paragraph "Option Bit Definition".

Changing a single option
It is also possible to change an option one at a time. Therefore, select the option with the CURSOR UP/DOWN keys and change its setting with the LEFT/RIGHT keys.

8.4.3 Option Settings

In the table, you will find the option settings.

Table 8-4 Option bit overview

Byte number	Bit number	Decimal value	Name	28PW8609/12	29PT8509/12	32PW8609/12
OB1	1	2	SCAVM	1	1	1
	5	32	RCMX	0	0	0
	6	64	EQTO	0	0	0
	8	256	WSSB	1	0	1
	12	4096	DGSC	1	1	1
	14	16384	SSHT	1	0	1
OB2	5	32	DBYV	1	1	1
	9	512	P50	0	0	0
	11	2048	QPEAK	0	0	0
	12	4096	EPG	0	0	0
OB3	0	1	AV3	1	1	1
	1	2	SCT3	0	0	0
	5	32	SOSD	0	0	0
	8	256	ASPR	1	0	1
	9	512	ROTI	1	0	1
OB4	3	8	PITN *	0	0	0
	4	16	PITN *	0	0	0
OB5	6	64	AAVL	1	1	1
OB8	4	16	PIPC	0	0	0
	5	32	PIPT	0	0	0
OB9	0	1	APC	1	1	1
	5	32	VMOD	0	0	0
	7	128	TIME	1	1	1
	8	256	DNR	1	1	1
	9	512	BBD	0	0	0
	10	1024	ASF	0	0	0
OB10	5	32	UKPNP	0	0	0
	6	64	DTXT	1	0	1
	8	256	SBNP	1	1	1
	9	512	AUSB	0	0	0
	10	1024	CZOM	1	0	1
	11	2048	HSHT	1	0	1
	14	16384	CHLK	1	1	1
OB11	9	512	T1H0	1	1	1
	13	8192	FAPG	1	1	1
	14	16384	ACI	1	1	1
OB12	8	256	PLST	1	1	1
OB13	0	1	T2H5	1	1	1
	2	4	T12H	1	1	1
	3	8	EWEU	0	0	0
	7	128	SMCK	1	1	1
	8	256	ATS	1	1	1

* = There are 2 bits for this option:
00 = Philips,
01 = Other

Unused options have a default value of "0"

8.4.4 Option Bit Definition

Sources
AV3: Side AV source.
Function: Disable/Enable side AV source.
Values: OFF= Disabled, side AV source is not available. ON= Enabled, side AV source is available.

SCT3: SCART 3 input.
Function: Disable/Enable Scart3 input.
Values: OFF= Disabled. ON= Enabled.

Video
ASPR: Aspect Ratio Setting.
Function: Select between 4 by 3 or 16 by 9 set.
Values: OFF= 4 by 3 set. ON= 16 by 9 set.

DNR: Dynamic Noise Reduction.
Function: Disable/Enable (Dynamic) Noise Reduction function.
Values: OFF=Disabled. ON= Enabled.

BBD: Black Bar Detection.
Function: Disable/Enable Black Bar Detection.
Values: OFF=Disabled, Black Bar Detection not available. ON= Enabled, Black Bar Detection available.
Note: The Auto Screen Fit will not be included in the picture size loop when BBD is OFF.

ASF: Auto Screen Fit.
Function: Disable/Enable Auto Screen Fit.
Values: OFF=Disabled, Auto Screen Fit is not available. ON= Enabled, Auto Screen is Fit available.

CZOM: Continuous Zoom.
Function: Disable/Enable Continuous Zoom.
Values: OFF=Disabled. ON= Enabled.

HSHT: Heading Shift.
Function: Disable/Enable Heading Shift.
Values: OFF=Disabled. ON= Enabled.

SSHT: Subtitle Shift.
Function: Disable/Enable Subtitle Shift.
Values: OFF=Disabled. ON= Enabled.

APC: Auto Picture Control (Auto TV).
Function: Disable/Enable Auto picture control.
Values: OFF= Disabled. ON= Enabled.

WSSB: Wide Screen Signalling Bit.
Function: Disable/Enable Wide screen Signalling bit function.
Values: OFF= Disabled. ON= Enabled.

ROTI: Rotation Tilt.
Function: Change the tilt level of picture tube.
Values: OFF= Disabled, menu item ROTATION is not available. ON= Enabled, menu item ROTATION is available.

DGSC: Digital Scan.
Function: Enable/Disable the Digital Scan in the DIGITAL OPT menu.
Values: OFF= Disabled, menu item DIG SCAN is not available. ON= Enabled, menu item DIG SCAN is available.

SCAVM: SCAVEM.
Function: Enable/Disable SCAVEM.
Values: OFF= Disabled. ON= Enabled.

Audio
AAVL: Automatic Volume Level control.
Function: Disable/Enable automatic volume leveller function.
Values: OFF=Disabled, menu item AVL is not available. ON= Enabled, menu item AVL is available.

DBYV: Dolby Virtual.
Function: Select surround setting.
Values: OFF= Disabled, DOLBY VIRTUAL setting is not available. ON= Enabled, DOLBY VIRTUAL setting is available.
Note: Incredible surround & Dolby virtual are mutually exclusive.

EQTO: Equalizer or Tone control.
Function: Selection between Equalizer and Tone control (Bass and Treble).
Values: OFF= Tone control (Bass and Treble). ON= Equalizer.
Note: Equalizer and Tone (Bass and treble) control are mutually exclusive.

QPEAK: AV Sound Mode detection.
Function: The current Sound Mode detection in AV is not working correctly. The optimal threshold value for the correct sound mode detection is still being investigated. Therefore, this is needed to disable the Sound Mode detection in AV until the correct threshold is identified.
Value: OFF= Disabled, AV sound auto detection is not available. ON= Enabled. AV sound auto detection is available.

Tuning
PITN: Philips Tuner.
Function: Choose the tuner type that is configured in the hardware.
Values: OFF= Disabled, ALPS compatible tuner is used. ON= Enabled, Philips compatible tuner is used.

Installation
ACI: Automatic Channel Installation.
Function: Disable/Enable automatic channel installation.
Values: OFF= Disabled Automatic Channel Installation. ON= Enabled Automatic Channel Installation.
Note: Download present program when ACI is ON.

ATS: Automatic Tuning System.
Function: Disable/Enable automatic tuning system.
Values: OFF= Disabled, automatic tuning system is ignored. ON= Enabled Automatic Tuning System, sort the program in an ascending order starting from Program 1.
Note: Sort the program in an ascending order starting from Program 1 when ATS is ON.

VMOD: Virgin Mode.
Function: Disable/Enable virgin mode.
Values: OFF= Disabled, cannot access virgin mode. ON= Enabled, can access virgin mode.
Note: Plug and Play menu item will be displayed to perform installation at the initial start up of the TV when MOD is ON and after installation is done, VMOD will be automatically set to OFF.

UKPNP: UK Plug and Play.
Function: Disable/Enable UK's default Plug and Play setting.
Values: OFF= Disabled, UK's default Plug and Play setting is not available. ON= Enabled, UK's default Plug and Play setting is available.
Note: When UKPNP and VMOD are ON at the initial set-up, LANGUAGE= ENGLISH, COUNTRY= GREAT BRITAIN and after auto store is complete, VMOD will be set automatically to OFF while UKPNP remain ON.

Program Selection
PLST: Program List.
Function: Disable/Enable Program List function.
Values: OFF= Disabled, the access to Program List Command is ignored. ON= Enabled, the access to Program List Command is processed.

Picture In Picture
PIPC: PIP Control.
Function: Disable/Enable submenu to adjust PIP Picture settings
Values: OFF= Disabled, PIP feature is not available. ON= Enabled, PIP feature is available
Note: PIP is present in FEATURES submenu when PIPC is ON. When PIPC is switched OFF, bits PIPT, W4X3, and W169 must be automatically set to OFF.

PIPT: PIP Tuner.
Function: To determine the presence of second tuner.
Values: OFF= Disabled, second tuner is not available. ON= Enabled, second tuner is available.
Note: When PIPC is switched OFF, bits PIPT, W4X3, and W169 must be automatically set to OFF.

Clock
SMCK: Smart Clock/Autochron.
Function: Disable/Enable smart clock/AutoChron function.
Values: OFF= Disabled, menu item smart clock function not available. ON= Enabled, menu item smart clock function available.
Note: For NAFTA, AUTOCHRON is present in INSTALL submenu when SMCK is ON. For AP-PAL and EUROPE, Smart clock downloaded from Teletext is enabled when SMCK is ON.

TIME: Timer.
Function: Disable/Enable menu item TIMER.
Values: OFF= Disabled, menu item TIMER not available. ON= Enabled, menu item TIMER available.
Note: TIMER submenu is present in FEATURES submenu when TIME is ON.

Data Service
DTXT: Dual Text.
Function: Disable/Enable Dual Text.
Values: OFF= Disabled. Dual text is not available. ON= Enabled. Dual text is available.

RCMX: RC for Teletext Mix Mode.
Function: Disable/Enable RC for Teletext Mix mode support.
Values: OFF= Disabled. RC for mix mode is not available. ON= Enabled, RC for mix mode is available.

FAPG: Favourite Page.
Function: Disable/Enable favourite page in Teletext mode.
Values: OFF= Disabled favourite page in Teletext mode. ON= Enabled favourite page in Teletext mode.

T1H0: 100-Page Text.
Function: Disable/Enable 100-page Text.
Values: OFF= Disabled. 100-page text is not available. ON= Enabled, 100-page text is available.

T2H5: 250-Page Text.
Function: Disable/Enable 250-page Text.
Values: OFF= Disabled. 250-page text is not available. ON= Enabled, 250-page text is available.

T12H: 1200-Page Text.
Function: Disable/Enable 1200-page Text.
Values: OFF= Disabled. 1200-page text is not available. ON= Enabled, 1200-page text is available.

Lock Features
CHLK: Child Lock.
Function: Disable / Enabled function to block/unblock channels.
Values: OFF= Disabled. ON= Enabled.

OSD/Menu Related
SOSD: Smart OSD.
Function: Disable/Enable full display of SMART SOUND and SMART PICTURE OSD.

Values: OFF= Disabled, full display of SMART SOUND and SMART PICTURE OSD not available. ON= Enabled, full display of SMART SOUND and SMART PICTURE OSD available.

Miscellaneous

SBNP: Auto Standby with No Picture.
Function: Disable/Enable automatic switch to standby after 15 minutes when no ident.
Values: OFF= Disabled, no automatic switch to standby. ON= Enabled, set switches to standby after 15 minutes when no ident.

AUSB: Auto Standby Auto On.
Function: Disable/Enable automatic switch to standby if no RC or local keyboard response after 4 hours provided that the set is ON from standby mode by the timer.
Values: OFF= Disabled, no automatic switch to standby. ON= Enabled, set switches to standby after 4 hours.

EPG: Electronic Program Guide.
Function: Disable/Enable EPG feature.
Values: OFF= Disabled, EPG feature is not available. ON= Enabled, EPG feature is available.

P50: P50 (Easylink).
Function: Disable/Enable P50 feature.
Values: OFF= Disabled, P50 feature not available. ON= Enabled, P50 feature is available.

EWEU: East/West Europe region.
Function: Select between East Europe and West Europe.
Values: OFF= West Europe. ON= East Europe

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

Index of this chapter:
1. Introduction
2. Block diagrams
3. Power supply
4. Video
5. Synchronisation
6. Audio
7. Control
8. Protections
9. Software upgrading
10. Abbreviation list

- Only **new** circuits (circuits that are not published recently) are described.
- For the "known" LSP circuits, see the EM5E manual. This manual is available under number 3122 785 12560 (= English).
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the diagrams in chapter 6 and 7. Where necessary, you will find a separate drawing for clarification.

9.1 Introduction

The A02 is intended as the Mainstream TV platform for the years 2003 and 2004 and successor to the A10. Covering three ranges (Digital Ready, Digital Prepared, and Digital Integrated) with screen sizes of 28 inch WS to 36 inch WS RF (16:9) and 29 inch to 38 inch RF (4:3). The platform supports 50 Hz, 100 Hz, and progressive scan.
It is based on the SALSA system (System Application for Lower Segment Analogue television), which is a highly integrated solution for TV. The system comprises two ICs: the ADOC (Analogue Digital One Chip) and the MPIF (Multi Platform InterFace). The MPIF IC performs analogue processing for IF, source selection, and analogue to digital conversion. The ADOC IC incorporates video and audio processing as well as the complete TV control functionality. The ADOC aims at the low and mid range market segment.

The split-up between an analogue (MPIF) and a digital part (ADOC) has the following advantages:
- High frequent parts (IF) can be included in the concept.
- Less A/D and D/A converters needed for source switching.
- Better performance for AD converters (realised in analogue design environment, more accurate, less tolerance).
- Critical items like reference voltages can be realised in the analogue environment.
- Integrated SCART buffers.

The new A02 chassis has the following features:
- An LSP (Large Signal Panel) that is based on the existing EM5 chassis.
- A new SSB (Small Signal Board) with very high integration.
- Upgradeable main software (via ComPair). The software is a large and re-engineered version of the 'MG' software used by Philips CE for several years.

9.1.1 Large Signal Panel

The chassis has a full sized LSP, which is identical to the one in the EM5 chassis.

The main functionalities of the LSP are:
- Supply,
- Deflection,
- Sound amplification.

The LSP (single sided) is built up very conventional, with hardly any surface mounted components on the copper side. It has a large "hot" part, including both deflection coils.

9.1.2 Small Signal Board

The SSB is a high tech module (four layer, 2 sides reflow technology, full SMC) with very high component density. Despite this, it is designed in such a way, that repair on component level is possible. To achieve this, attention was paid to:
- Accessibility of the test points. The SSB has good accessible service positions.
- Clearance around surface mounted ICs (for replacing).
- Detailed diagnostics and fault finding is possible via ComPair.
- Software upgrading is possible via ComPair.

The main functionalities of the SSB are:
- Tuner input,
- I/O interface provisions,
- TXT and Control,
- Video and Audio decoding,
- Feature Box,
- Sync and Geometry control.

Further features of the SSB are:
- The PIP functionality (when present) is integrated on the SSB.
- The 3D Comb filter functionality (for USA) is integrated on the SSB.

On the photographs you can see where the key components are located on the SSB:

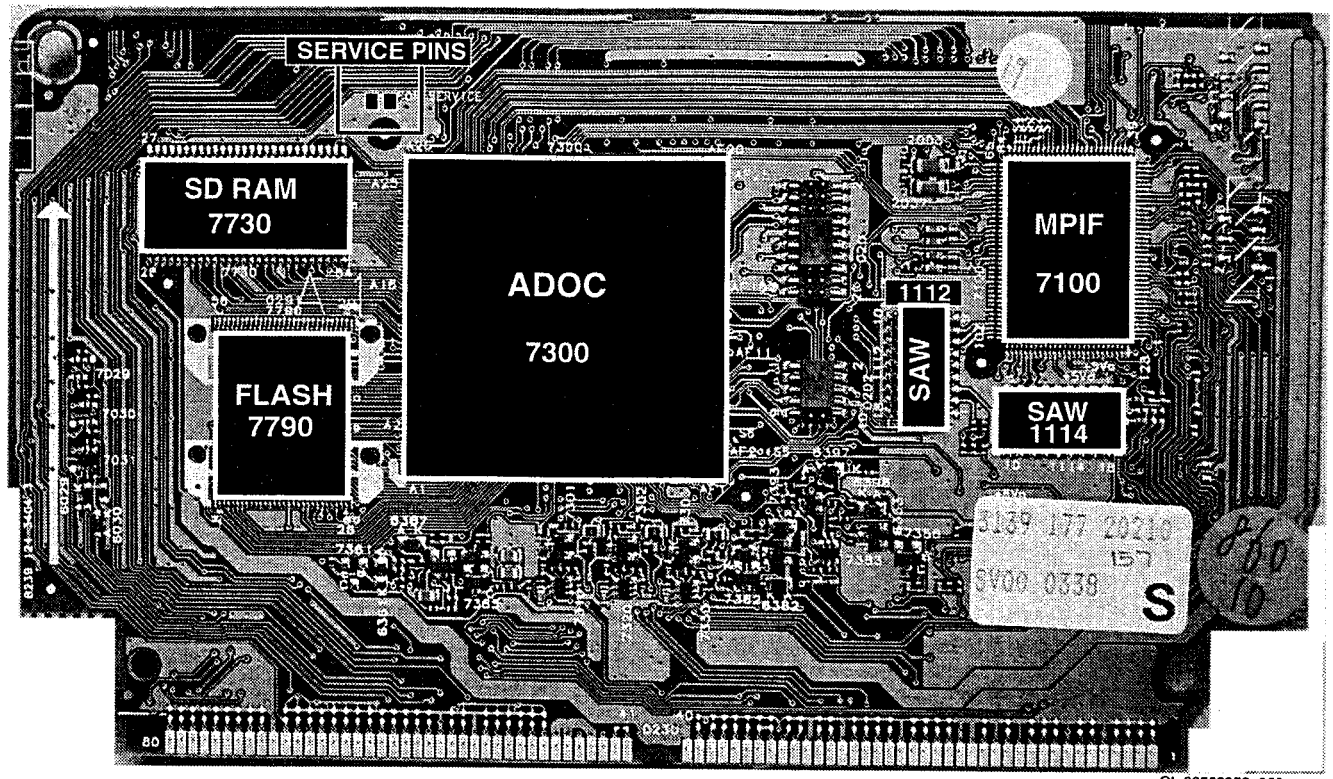

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Figure 9-1 SSB top view (tuner side)

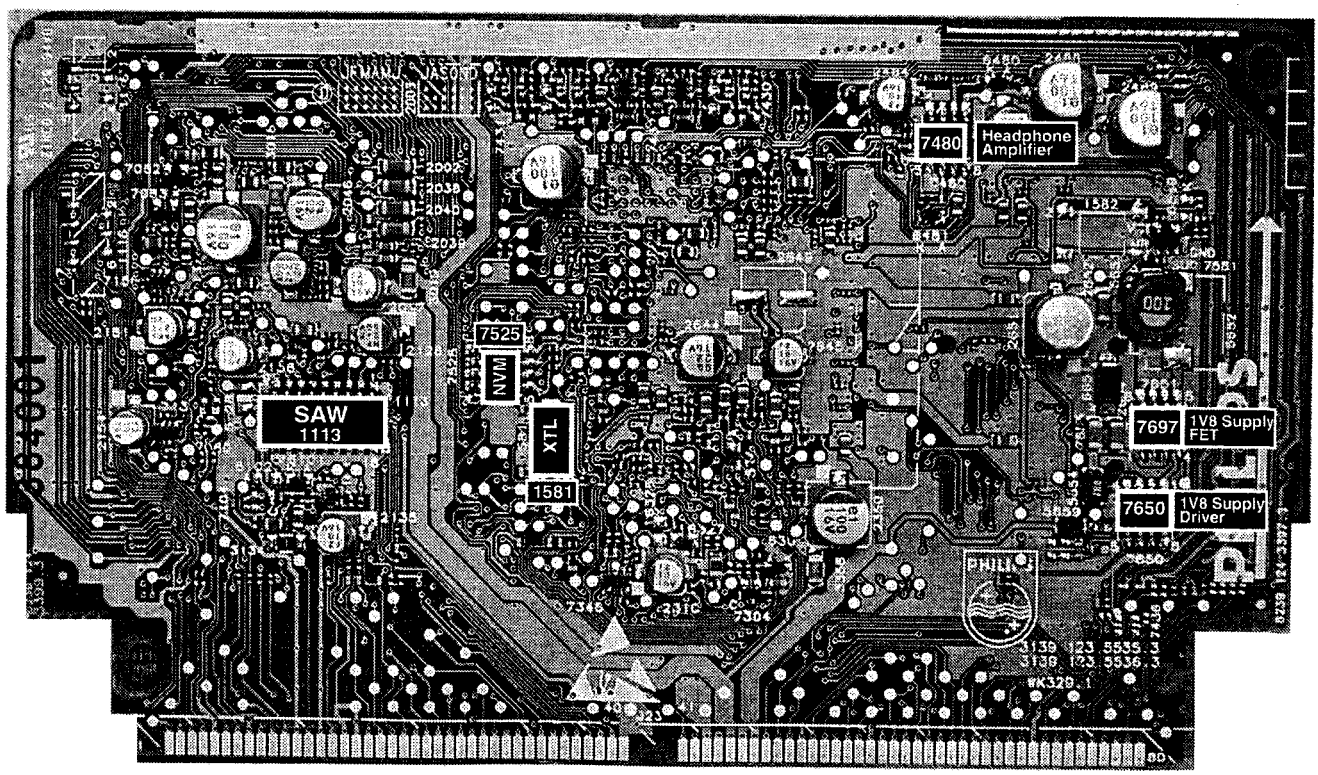

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Figure 9-2 SSB bottom view (LOT side)

9.2 Block Diagrams

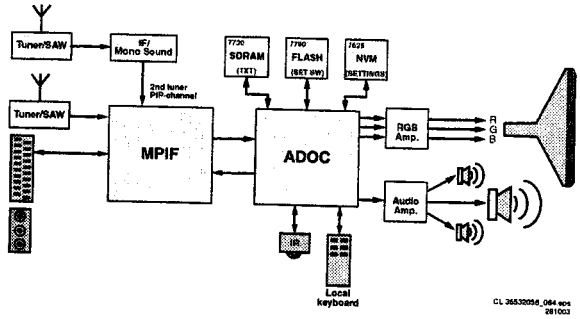

Figure 9-3 Chassis block diagram

The tuner is a PLL tuner and delivers the IF-signal, via audio and video SAW-filters, to the MPIF IC (Multi Platform InterFace). This is an analogue video and audio pre-processing unit for the ADOC TV processor. It contains the high frequent IF part and all the analogue video and audio source switching for external in- and outputs. The MPIF can handle CVBS, Y/C, RGB (1fH/2fH) and YPbPr (1fH/2fH) video signals as well as stereo, I2S, and second sound IF audio signals. The MPIF converts the selected video and audio streams from the analogue to the digital domain. Via three high-speed serial data links (I2D), the digitised audio and video signals are streamed to the ADOC IC for further processing.

The ADOC (Analogue Digital One Chip) is a fully integrated, digitally implemented TV processor for audio, video, Vertical Blank Interval services, graphics, and control. It is a global, multi-standard system primarily designed for the reception and processing of analogue broadcast signals.
Internal video processing is done in the ADOC with YUV-signals. It also handles the video control, geometry part, and the insertion of the TXT/OSD RGB-signals. The video part delivers the RGB signals to the CRT-panel and the geometry part delivers the H-drive, V-drive (differential output), and E/W-drive.
An integrated MIPS 1910 processor runs the chassis software and takes care of the set control, error generation TXT/OSD input-, and output processing. The NVM (Non Volatile Memory) is used to store the settings, the Flash-RAM contains the set software, and the SDRAM stores the Teletext pages (in some versions, this is stored in the internal memory of the ADOC).

Both deflection circuits are located on the LSP and are driven by the ADOC. The horizontal output stage generates also some supply voltages and the EHT-, focus- and Vg2-voltages.

The RGB amplifiers on the CRT-panel are integrated in one IC and are supplied with 200 V from the LOT. The SCAVEM circuit modulates transitions of the Luminance (Y) signal on the horizontal deflection current, giving a sharper picture.

Sound IF processing, audio source selection, and audio analogue-digital signal conversions are done in the MPIF IC. The ADOC contains a digital TV sound processor for analogue and digital multi-channel sound systems in TV sets. By hardware programming, several applications can be scaled. The audio output stage is built around a balanced amplifier, and is located on the LSP. It uses a monolithic integrated power amplifier IC, the TDA7497. The gain of the amplifier is constant. This means that volume control is done via the ADOC.

The power supply is a Switch Mode Power Supply (SMPS) with minimum voltage switch. It is a flyback converter with primary current sensing, secondary voltage sensing, and mains input measuring. It is built around IC7921 (which has a built-in MOSFET and control circuit) and generates a.o. the 140 V (V-BAT) and the 27 V (for the audio part).

During Standby, the power supply is switched to a 'low power burst mode' via TS7946 and the following burst mode generator, in order to reduce the power consumption.
A relay is used to switch the degaussing circuit for several seconds during switching 'ON' of the set.
There is a separate Standby Supply, in order to reduce the Standby power consumption. During Standby, the Main Supply is switched "off" (via TS7529).
A relay (1550) is used to switch the Degaussing circuit. It is switched "on" after set start-up and switched "off" by the microprocessor after 12 s.
The Main Supply, a SMPS based on the "boost converter" principle, generates the 141 V (V_BAT) and the +/- 16 V for the audio part.

9.3 Power Supply

9.3.1 Introduction

The power supply circuitry is located on the large signal PWB, together with the audio amplifier and the deflection. It comprises of:

- Mains entrance with fuse.
- Separate standby -supply.
- Mains harmonic circuit.
- Mains rectifier.
- Main-supply: is able to deliver a continuous power between 100 W and 160 W.
- Degaussing.

For a detailed circuit description, see the EM5E Service Manual.

9.3.2 Power Supply architecture

The A02 SSB is supplied by +5V, +5.2V, +3.3V and +8V supply lines from the LSP. The SSB contains:

- A DC/DC converter which steps down +5.2V to +1V8,
- A switch to cut off the 3V3 supply to the 3D Comb in "Standby" mode, and
- A regulator to generate the 2V5.

When the set is in "Power STANDBY" mode, the +5.2V, +3.3V supply lines are present. Consequently, only the ADOC IC (+3V3 and +1V8), the SDRAM (+3V3), the Flash memory (+3V3), and the NVM memory (+3V3) are supplied. Other than NVM, all the other devices are powered down in "Standby" mode. See section below for more details on the power modes.

OFF Mode
The set is completely switched "off" from the mains. This is done with the mains switch for Europe and AP (for NAFTA it would mean disconnecting the TV from the mains by pulling out the mains cable). Depending upon the last Standby Status (stored in NVM), this mode can transit to "ON' mode or "STANDBY" mode.
The transition timing for a Cold start from "OFF" state to "ON" shall be such that from the instance the ADOC gets a hard reset, within 3 seconds one will hear the audio and within 7 seconds one will see the picture.

ON Mode
This is the normal operating mode. All the power supply lines on the A02 SSB and LSP are available. All the circuits in the set are active. From this mode, it is possible to transit to "STANDBY", "SEMI-STANDBY", "PROTECTION", or "OFF" mode.

STANDBY Mode
The total power consumption of the TV set in this mode is equal or less than 1 W. The Standby state will be indicated by the LED. In this state only the ADOC, SDRAM, Program Memory, NVM, and all means to wake-up the set are powered. Rest of

the A02 sub-systems are disconnected. This is controlled by a STANDBY control port.
The transition timing from "STANDBY" to "ON" state is such that within 3 seconds, one will hear the audio and within 7 seconds, one will see the picture. From this mode, it is possible to transit to "ON", "SEMI-STANDBY", or "OFF" mode.

SEMI-STANDBY Mode

All the circuits in the set (ADOC, MPIF, etc), except the Audio output, Deflection, and hence CRT display, are powered up and fully active. The Audio Mute is activated. The set, however, will appear to behave and to look like "STANDBY" mode to the user. The user is totally oblivious of the existence of this mode. The status of the power supply lines and the estimated total power consumption of the SSB are the same as "ON" mode. In this mode, the ADOC ICs horizontal deflection drive output is disabled, while the STANDBY control port is disabled. This consequently causes the LOT stage on the LSP to be inactive (although V_batt voltage is present) that, in turn, will cause the EHT to be cut off. This in turn will cause the CRT display to be inactive.
From this mode, it is possible to transit to "ON" mode, "STANDBY" mode, "PROTECTION" mode or "OFF" mode.

PROTECTION Mode

Power profile for protection mode is as low as required to allow "soft" diagnostics, error detection, and to indicate LED flashes to flag the type of fault. The horizontal deflection is "OFF" in this mode. From the protection mode, the only possible transition is to "OFF" mode.

9.3.3 Start Up Sequence

1. When we start the set (cold start), initially 5V2, 3V3, and 1V8 will be available. These come from the Standby module of the power supply.
2. After this, the microprocessor resets (tied to 1V8 and 3V3 supplies) and checks the last status of the supply from the NVM. Accordingly, the set will be put in STANDBY or in the normal ON condition.
3. Now, 5V and 8V are available if the last status was ON condition, and the DOP is initialised by the microcontroller through the PI bus (not via the I2C).
4. The H-drive will become available from the DOP, which is the source for the SUP_ENABLE signal.
5. Via the "SUP-ENABLE" signal, the Main Supply is switched "on" and will deliver the V_BAT to the Line deflection stage.
6. EHT generation is now started.
7. The uP will un-blank the picture.
8. When you switch "off" the set, this is done in a controlled way via the POR (Power On Reset) signal.

Note: Standby is controlled by the STANDBY Line of the uP (not by the DOP).

9.3.4 Shut Down Sequence

This section describes the processes that need to be handled by hardware and software when power is disconnected from the set.
Some system requirements:

- To handle CRT discharge.
- To handle "switch off" plops.
- To prevent NVM corruption at switch "off".
- To effectively distinguish between the condition of mains interruptions and shutdown and handle them properly.
- The "power down" detection is acquired from the deflection supply (+11V) and the level is translated to +3.3V (this event has the highest interrupt priority to trigger SW shutdown procedure).
- Power down detection is fed to the FBCIN input, initiates a slow stop, and hence ensures CRT discharge (it is important that the slow-stop is maintained for at least 50 ms to assist good discharge).
- The microcontroller, hence the system, shall have a clean power "on" and power "off" reset with respect to its supply. The microcontroller shall not be operational when the supply voltage is below the recommended limits. The transition between active and reset is fast.
- The microcontroller "off" reset must occur much later (> 45 ms) than the POWER DOWN signal (P.DN).

When the POWER DOWN interrupt occurs, there is no way of knowing whether it is due to Medium Mains Interruptions or due to shutdown. Hence, there is no choice but to initiate shutdown procedure as described further below. The definition of Mains Interruption is given below:

- **Short Mains Interruptions.** Duration of the interrupts <= 55 ms. The set shall continue to work properly. The "power off" acquisition circuit shall filter such events.
- **Medium Mains Interruptions.** Interruptions are of the order 70 to 80 ms. This is a typical situation when the "power off" acquisition circuit, signals that the power is going down but the microcontroller does not get a reset. In this condition, a POWER DOWN signal is generated but no POWER OFF RESET signal is available.
- **Long Mains Interruption or Shutdown.** Any interrupt above 80 ms shall cause a microcontroller reset and hence a cold start. This happens, when the power is disconnected long enough to get a "Power Off Reset" as well as the microcontroller reset. After this situation, the system would automatically cold start when the power resumes.

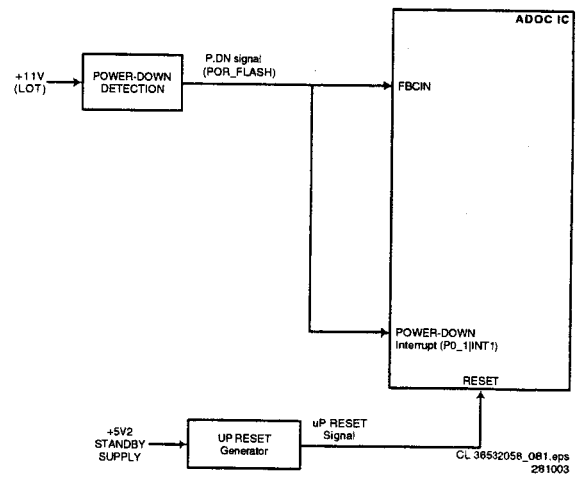

Figure 9-4 Shut down block diagram

Shutdown Procedure

1. Exclude all processes and do not respond to any interrupts - including RC events. However, during the following defined conditions of stopping the deflection (DFL-bit= 0), ignore the P.DN interrupt and rest of the procedure:
   - The system switched from ON to Standby by the user.
   - Protection event that forces the H-Deflection to stop.
   - Any other SW controlled event that causes the deflection to stop.
2. Since the P.DN signal is connected to FBCIN input, the DOP shall slow stop immediately - no software intervention is required. The precondition for this is that the FBDM bit in DOP is set to "1". The slow -stop process will continue for the next 40 ms or so.
3. Mute Audio Output / Sound Enable line.
4. Mute audio external outputs (in ADOC).
5. Set the DFL-bit to "0", such that deflection shall not restart after the slow -stop process is done.
6. Disable NVM access. Do the following:
   - Put the NVM in standby state to stop I2C write to NVM, by sending the Universal Reset Sequence.
   - Set Write Enable high: this avoids any further Write sequence to the NVM.
7. Disable all the I2C hardware communication.

8. Wait for 200 ms and execute a cold start when there is no microcontroller-reset signal. This is considered as "medium mains interruption".
9. After the cold start, the set should resume to the last status of user settings.

9.4 Video

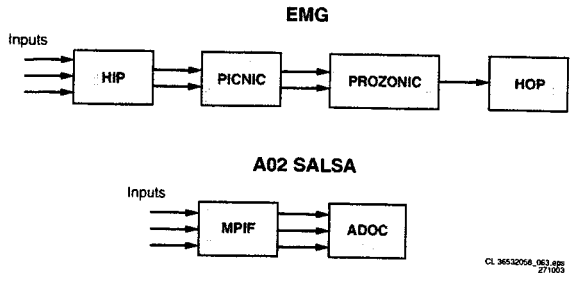

Figure 9-5 Signal processing A02- versus EMG-chassis.

The SALSA video processing part is a highly integrated solution. It comprises only two ICs, the ADOC (Analogue Digital One Chip) and the MPIF (Multi Platform InterFace), while in the EMG-chassis, this was handled by four ICs (HIP, PICNIC, PROZONIC, and HOP).
The MPIF uses a nominal 8V and 5V supply, while the ADOC requires nominal supplies of 1.8V and 3.3V.

The video processing of the SALSA system can be spilt into six parts:
- Initial source selection and analogue to digital conversion performed by MPIF.
- Demodulator (VIDDEC) performed by the ADOC.
- Front End Features (FEF) performed by the ADOC.
- Memory Based Features (MBF) performed by the ADOC.
- Back End Features (BEF) performed by the ADOC.
- Digital Output Processing (DOP) performed by the ADOC.

9.4.1 MPIF Analogue Frond End

Introduction
The MPIF (Multi Platform InterFace, type number PNX3000, item number 7100) is an analogue video and audio pre-processing unit for the ADOC TV processor. It contains the high frequent IF part and all the analogue video and audio source switching for external in- and outputs. The MPIF can handle CVBS, Y/C, RGB (1fH/2fH) and YPbPr (1fH/2fH) video signals as well as stereo, I2S, and second sound IF audio signals. The MPIF converts the selected video and audio streams from the analogue to the digital domain. Via three high-speed serial data links (I2D), the digitised audio and video signals are streamed to the ADOC IC for further processing. Following figure shows the MPIF block diagram.

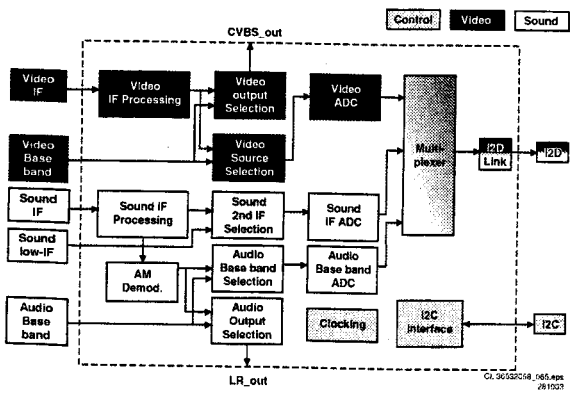

Figure 9-6 MPIF block diagram

Some MPIF features:
- IF Processing:
  - Amplifier, AGC.
  - Down mixer to base band.
  - Sound trap, low pass filter.
- Video base band switching:
  - CVBS, Y/C.
  - RGB, YPbPr (1fH/2fH).
- Audio base band switching.
- Video and audio A/D conversion.
- I2D formatter:
  - Data transfer to ADOC.
- SCART output buffers.

Vision IF
The video signal is demodulated by means of an alignment-free PLL carrier regenerator with an internal VCO. This VCO is calibrated by means of a digital control circuit, which uses an external crystal frequency as reference. The frequency setting for the various standards (33.4, 33.9, 38.0, 38.9, 45.75 and 58.75 MHz) is realised via the I2C bus.
The AFC output is generated by the digital control circuit of the IF-PLL demodulator and can be read via the I2C bus.
The AGC-detector operates on top sync or top white level.
The MPIF IC has an integrated sound trap filter. The trap frequencies can be switched via the I2C-bus.
Also, a group delay correction filter is integrated. The filter can be switched between the PAL BG curve and a flat group delay response characteristic. This has the advantage that in multi-standard receivers the video SAW filter does not need to be switchable (cost effective).

Sound IF
The MPIF has a separate sound IF input to enable Quasi Split Sound (QSS) applications. The sound IF amplifier is similar to the vision IF amplifier and has a gain control range of about 55 dB.
The AGC detector measures the SIF carrier levels (average level of AM or FM carriers) and ensures a constant signal amplitude for the AM demodulator and QSS mixer.
For applications without SIF SAW filter, the IC can also be used in intercarrier mode. In this mode, the composite video signal from the VIF amplifier is fed to the QSS mixer and converted to the intercarrier frequency. AM sound demodulation is realised in the analogue domain with the QSS mixer.

Source Selection
The following selector parts can be identified:
- **CVBS/YC source selector.** The video input selector consists of four independent source selectors, that can select between the CVBS signal coming from the IF part and four external CVBS signals. Two of the external CVBS inputs can also be used as YC input. One selector is used for selection of the primary video channel. A second selector selects the CVBS or YC signal for the secondary channel. The third and fourth selectors are used for selection of analogue CVBS outputs A and B for SCART or line output. The primary channel can be a CVBS or YC signal. If an YC signal is selected for the secondary channel or external CVBS outputs A or B, the luminance and chrominance signals are added so that a CVBS signal is obtained. The video identification circuit detects the presence of a video signal on the CVBS_IF input (CVBS0). The identification output can be read via I2C bus and is normally used to detect transmitters during search tuning.
- **RGB/YPbPr source selector.** The IC has two RGB inputs. Both inputs can also be used as YPbPr input for connection of video sources with an YPbPr output like a DVD player. The RGB inputs can also be used for fast insertion of RGB signals (for instance on screen display menu's) in the primary CVBS signal. The fast insertion switch is located in the digital video processor. The RGB signals are converted to YUV before further processing. The YUV output signal is digitised with the help of two A to D converters. The U and

V components have half the bandwidth of the Y signal, because the U and V signals are multiplexed and digitised with the help of **one** A to D converter.

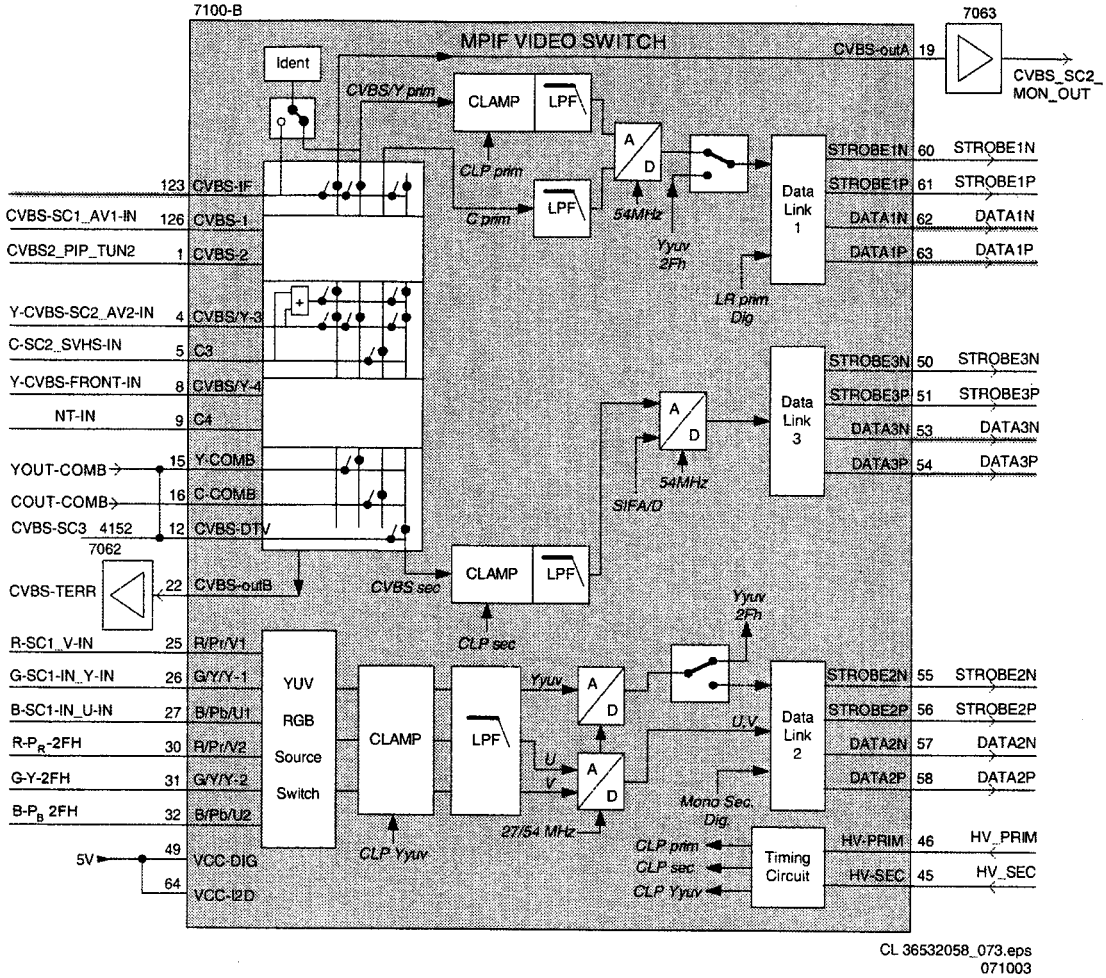

Figure 9-7 MPIF Video source selection

- **Audio source selectors.** The MPIF contains two different audio source selectors. The first selector selects which audio signals are routed to the audio ADCs for further processing in the digital domain. The selector has two outputs, a primary channel and a secondary channel:
  - The primary audio channel is used for one stereo signal. The secondary audio channel can carry a second stereo signal or AM sound signal.
  - The second selector selects which audio signals are fed to the analogue audio outputs for SCART and line out. This selector has also two stereo inputs for demodulated sound signals coming from the digital video processor.

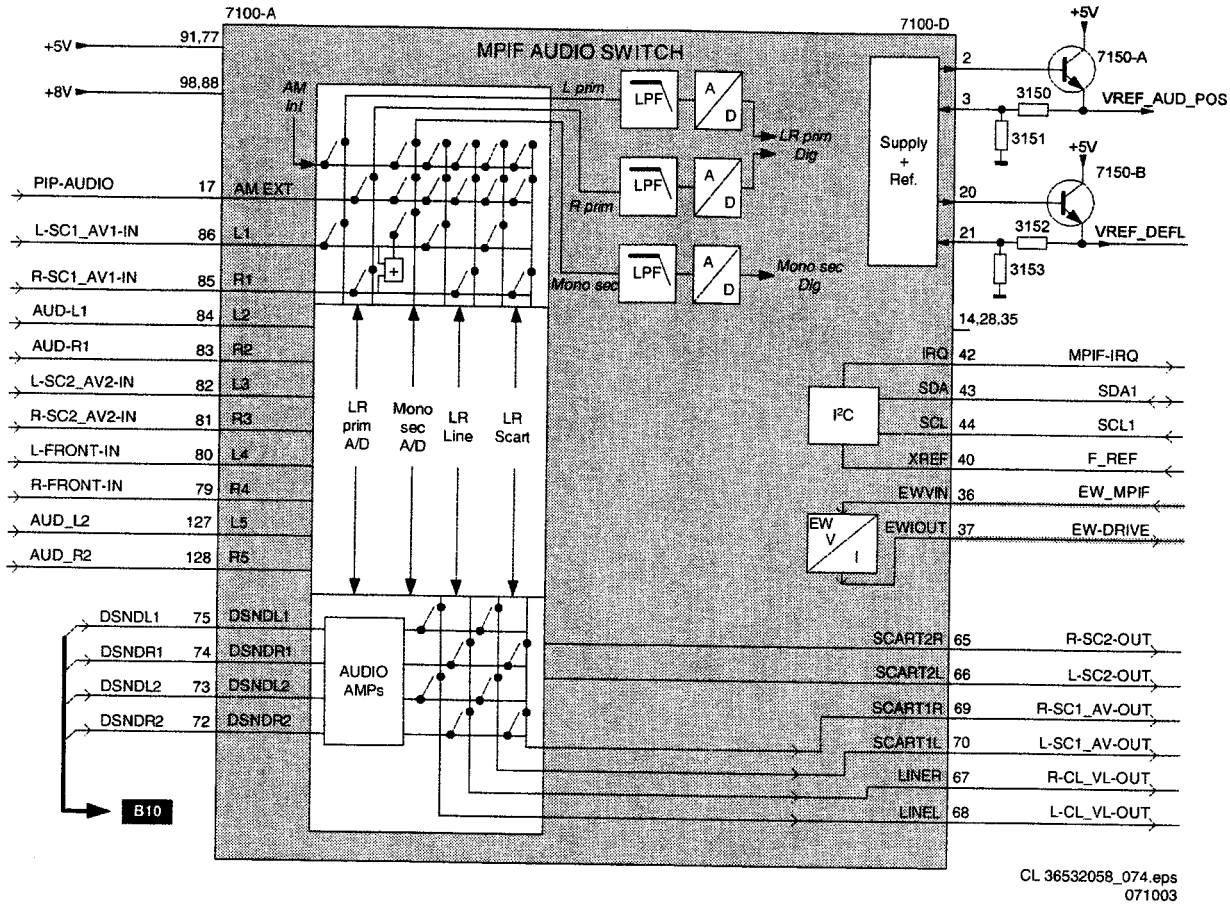

Figure 9-8 MPIF Audio source selection

A to D Converters

The MPIF contains four video ADCs for analogue and digital video broadcast signals. The clock frequency for these ADCs is either 27 MHz or 54 MHz. In some cases, two analogue signals are multiplexed at the input of one ADC. In these cases, the clock frequency of the ADCs is 54 MHz, while the sample frequency for each of the two signals is 27 MHz.

The sample frequency for standard 1fH video signals is 27 MHz.
For the YUV channel the sample frequency of the U and V components is half the sample frequency of the Y signal.
For 2fH YPbPr or RGB input signals (for instance 480p or 1080i ATSC signals), the frequency that is used to sample the YUV signals is twice as high as for 1fH signals. The sample frequency is 54 MHz for Y and 27 MHz for U and V.
Due to the high sample frequency, two data links are needed for transport of the video data to the digital video processor.

9.4.2 Data Link Interface (I2D)

The digital interface between MPIF and ADOC is called Data Link (or I2D Link). Data Link is a pin efficient, EMC friendly and power efficient serial interface that transfers the data from MPIF to ADOC over three Data Link interfaces. Each Data Link has a data signal and a strobe signal. The synchronisation information is distributed over the data and the strobe signal. To minimize EMC, both signal outputs are low voltage differential swing signals, with a swing of about 300 mV. Each Data Link has four lines, one differential pair for the data, and one differential pair for the strobe. The data rate is 594 Mbit/s. Each Data Link can carry two 27 MHz sampled video streams (or one 54 MHz sampled 2fH video stream) and two audio channels sampled at 6.75 MHz.

In the MPIF, the (video and audio) data to be transmitted is multiplexed in an output register of 42 bits. The content of that 42 bits register is serial transmitted on one of the three data links. In the ADOC, the serial data is de-multiplexed into parallel streams. The data on the data link is divided in several groups of signals (video, audio and strobe signals). Obvious it is important that the transmitter and receiver are in the same transmitting mode.

9.4.3 ADOC Digital TV Processor

Introduction

The A02 system is built around the ADOC IC. This chip implements all TV functions in digital technology. Only a few functions (like AD-conversion, IF processing and source select) are implemented in an analogue companion IC, the MPIF.
The ADOC (Analogue Digital One Chip, type number PNX3001-3008, item number 7300) is a fully integrated, digitally implemented TV processor for audio, video, VBI services, graphics, and control. It is a global, multi-standard system primarily designed for the reception and processing of analogue broadcast signals.
An integrated MIPS 1910 processor runs the chassis software. This software is stored in a non-volatile external flash memory (item 7790). Following figure shows the ADOC block diagram.

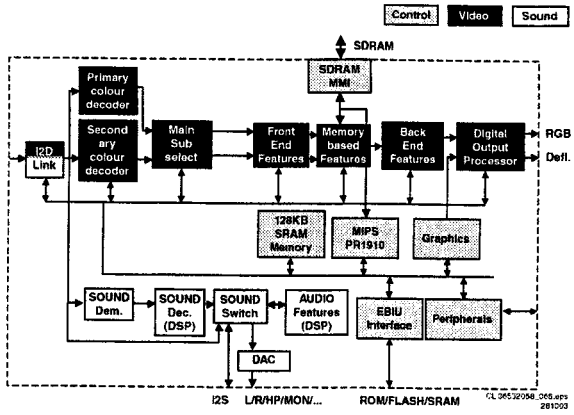

Figure 9-9 ADOC block diagram

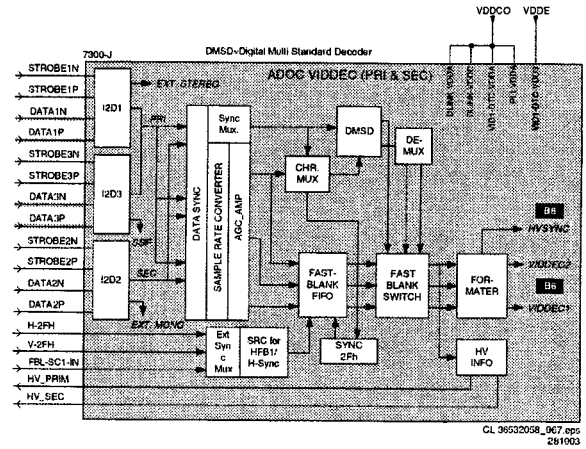

Figure 9-10 VIDDEC block diagram

The dual stream architecture of the ADOC system allows audio and video processing of two A/V sources simultaneously. The two video streams can be displayed in several programmable ways (main screen, PIP or DW). The two audio streams are audible via the TV loudspeakers and/or the headphones.
For the memory-based features (like scan rate conversion, 3D-Comb filtering, dynamic noise reduction, and PIP/DW applications), external SDRAM is used (item 7730).
The ADOC also has 128 kBytes of internal SRAM memory. This memory is used to run low latency, timing critical parts of the software. The internal memory is also used if the system operates in a single scan 50/60 Hz interlace application without any other kind of memory based features. Under these circumstances, no external SDRAM is needed.

Some ADOC features:

- Video Decoding:
  - 2-Colour Decoder (PAL, NTSC, SECAM).
  - 2D and 3D Comb filter.
- Memory Based Features:
  - PIP/DW, DNR, Scan Rate conversion.
- Picture Improvements:
  - CTI, LTI, Colour correction.
- Digital Output Processor:
  - RGB processing, Scavem, Deflection control.
- Audio Processing:
  - Demodulator/Decoder (A2, NICAM, BTSC).
  - Tone, Volume, Balance, Dolby ProLogic.
- VBI (Vertical Blank Interval) Services:
  - Teletext, Closed Caption, V-chip.
- TV Control:
  - I2C, UART, IR, Keyboard.
- Graphics:
  - Character based.

Video Decoding (VIDDEC)

The Video Decoder (VIDDEC) is the video input processor and colour decoder. There are two VIDDECs: the primary and the secondary VIDDEC. The VIDDEC processes all CVBS, Y/C, and 1fH/2fH component (e.g. RGB) video input signals.

Primary VIDDEC (1fH/2fH)

The primary VIDDEC supports the following functionality:

- Conversion of the digitised samples from MPIF into orthogonal samples (meaning fixed number of pixels per line, independently of line frequency).
- Correction for any amplitude errors of the input signals (CVBS, YC, or YCbCr) by means of an Automatic Gain Control (AGC).
- Standard detection of PAL/NTSC or SECAM and various 1fH/2fH component input formats.
- Colour decoding for PAL, NTSC, or SECAM input signals.
- Sync identification (to be used for channel search).
- Sync processing for any 1fH or 2fH input signal.
- Fast-blank insertion of RGB signals (supplied via MPIF) on CVBS input signals.
- 2D Comb filtering. 3D Comb filtering is implemented in the Memory Based Feature block of the Feature Box.

Secondary VIDDEC (1fH)

The secondary VIDDEC is mainly intended for use with PIP/DW. It supports the following functionality:

- Conversion of the digitised samples from MPIF into orthogonal samples (meaning fixed number of pixels per line, independently of line frequency).
- Correction for any amplitude errors of the input signals (CVBS) by means of an Automatic Gain Control (AGC).
- Standard detection of PAL/NTSC or SECAM and various 1fH component input formats.
- Colour decoding for PAL, NTSC, or SECAM input signals.
- Sync identification (to be used for channel search).
- Sync processing for any 1fH input signal.
- CVBS 1fH input signals only.

Data Synchroniser and Sample Rate Converter

The data synchroniser is a de-multiplexer that separates the UV stream into a separate U and V data stream. The sample rate converter converts the video samples from the crystal clock domain to the so-called line locked clock domain, 720 pixels per line.

Automatic Gain Control (AGC)

The AGC amplifier block controls the gain of the signal and is controlled directly by the chassis software. This gain will depend on the amplitude of the output signal (signal amplitude and/or sync amplitude) as measured by the AGC gain block. As a secondary function, it controls both the offset at the input and the offset at the output of the gain control.

Digital Multi Standard Decoder (DMSD)

This DMSD block contains the following functionality:

- Decodes a CVBS or Y/C (primary VIDDEC) signal and converts it to an YCbCr signal format. All world colour standards are supported.
- YC detection (primary VIDDEC) via a SW algorithm.
- 50/60 Hz, interlace/progressive, field polarity, and no-YC detection.
- A chroma notch with programmable width.
- 2D Comb filter (primary VIDDEC). The 3D Comb filter uses the attached SDRAM memory and is implemented in the FBX.
- Macro vision detection.

Comb Filter
The ADOC 2D comb works purely in the vertical direction, but can bypass the entire signal as luminance straight away. The 2D comb uses the 180 degrees phase shift of the colour carrier between successive lines or two lines apart. Adaptive two or four delay lines 2D Y/C comb filtering is only possible for sources routed onto the Main-Video path.

In the 3D comb filter implementation (for USA only), the 2D comb filter processing in ADOC IC (on the Main-Video path) is disabled via SW. The signal input for the 3D YC comb-filter circuit is derived from the CVBS-SC2_MON-OUT signal path. The processed signal is re-inserted back via YCOMB and CCOMB inputs of the MPIF IC.

Standard Detection
The Standard Detection part identifies PAL/NTSC/SECAM/BW but also involves Horizontal and Vertical sync identification (both 1fH and 2fH) as well as YC detection (via a SW algorithm).

YUV Multiplexer
The YUV mixer selects between the YUV output of the DMSD and 1fH component video input signals (RGB, YPbPr) or 2fH input signals (RGB, YPbPr, ATSC). The YUV mixer can also be controlled via a fast blanking input (SCART) to insert RGB signals, such as descrambler OSD or full RGB insertion of DVD players.
When a 2fH input signal is selected as a input, the complete primary VIDDEC is running at 2fH (54 MHz), including DMSD (in this scenario, the DMSD cannot be used any more for CVBS input signals, and as such, VBI data slicing cannot be done).

Feature Box
The Feature Box (FBX) in the ADOC can be divided into three functional parts: The front-end features (FEF), memory-based features (MBF), and back end features (BEF).

The FEF part of the FBX implements all signal analysis functions as well as black stretch and histogram correction.
The MBF part applies spatial scaling, temporal noise reduction and up-conversion to either progressive scan or a double field rate (100 Hz).
The BEF part implements spatial picture enhancement functions like sharpness and colour enhancement functions, sharpness measurement and horizontal scaling and panorama
The FBX has two video inputs coming from VIDDDEC 1 and 2, and outputs one RGB video stream to the display output processor (DOP).
The following sections describe the three functional parts of FBX in more detail.

Front End Features (FEF)
The FEF consists of several signal analysis functions (HME, BLD, BBD, NEST), histogram correction (HMO) and black-stretch (BS). Following figure shows the functional block diagram of the video frond-end features (FEF). All signal processing in the FEF is nine bits based.
The FEF has two video inputs coming from the VIDDECs. For every block, one video source can be chosen as input, independently for every block. The FEF has two video outputs, designated as "main" and "sub".

Histogram modification can only be performed on the main channel; therefore, the HME block is general connected to the same video source as the main channel. Besides the two VIDDEC inputs, there is also a third virtual input, the "blanking" input. Only main and sub can be connected to this blanking input, and at the same time, it can be specified which sync source has to be used (VIDDEC1 or VIDDEC2).

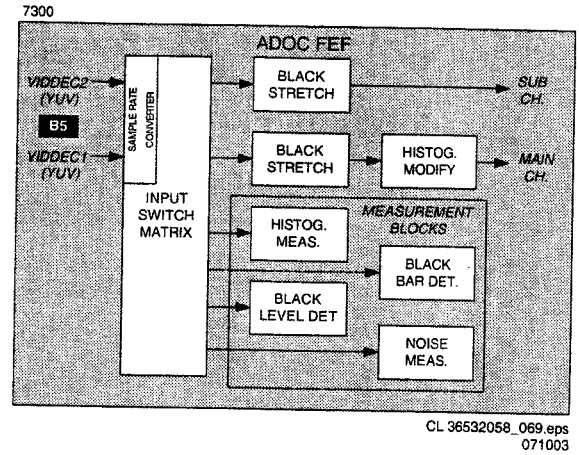

Figure 9-11 FEF block diagram

When a single stream is displayed, the main output is used for this stream. Also, all signal analysis functions should be connected to the same VIDDEC as the main channel is connected to.
When two streams are displayed, then there are two user scenarios: Picture In Picture (PIP) and Double Window (DW). In the PIP scenario, the full screen picture is displayed via the main channel, and the PIP stream is switched to sub. In the DW scenario, selection of the video sources for main and sub depends on if the two streams have a different vertical resolution and how the system has to cope with this difference.

Following blocks are present:
- **Black Stretch (BS).** The function of BS is to pull the dark areas in a picture to even darker levels. BS is available in both the main and sub channel.
- **Histogram (HMx).** This block measures of every field in a programmable (measurement-) window the histogram of the luminance signal. The measurement window is set-up such that the area that contains the subtitles or black bars does not contribute to the histogram.
- **Black Bar Detection (BBD).** Many broadcasts or software played on TVs produce a so-called "letterboxed" picture. Black bars appear above and below the picture. Due to bad standardisation of the aspect ratio, e.g. the size of the black bars, there is a need to actively analyse the picture and determine of the picture is in letterbox format and what the size of the black bars is. Black bars are detected by determining if a defined number of pixels (analysed within a programmable window located in active video) are black. The output of the BBD is the first non-black line and the last non-black line.
- **Black Level Detection (BLD).** The BLD determines within a programmable (measurement) window the "black level" of a picture. The BLD will be used for the BS, but if required, it can also be used for the BBD. The BLD function records in multiple small windows within the measurement window the maximum luminance. The minimum luminance level of the various recorded maximum luminance levels is the true black level. By measuring the maximum luminance level in a small window, the BLD is not sensitive to "black" spikes.
- **Noise Estimation (NEST).** The NEST block analyses the video and outputs a number correlating to the amount of noise in the picture. A basic problem is that picture detail is also 'recognised' as noise. Several control- and status-

registers are added to compensate this. The video signal is only analysed when it is within a programmable (measurement) window. This window coincides with a rectangular shaped part of the (visible) picture. Normally this is the centre part of the picture.

Memory Based Features (MBF)

The Memory Based Features (MBF) block embodies a set of functions that require (shared) memory.
The main and sub video streams can be spatially compressed in order to produce a mixed output in the form of several PIP combinations or DW.
The main video stream can be passed through a temporal noise reduction circuit (DNR).
The 3D Comb filter is also implemented in this block.
The main and sub streams are merged when reading from memory. The merged video stream can be up-converted to either a double line rate (progressive scan) or to a double field rate (100 Hz). The up-conversion is done by means of a digital scan function. Following figure shows the functional block diagram of the video memory based features (MBF).

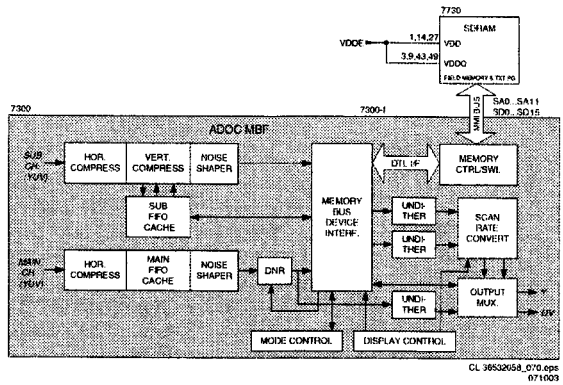

Figure 9-12 MBF block diagram

Back End Features (BEF)

The Back End Features (BEF) block embodies a collection of spatial picture enhancement functions.
The video display has to be blanked during AV switching, channel switching, V-chip, and Child Lock modes. This is done inside the BEF block of the ADOC IC. The fast blanking signal input from SCART1and SCART3 (TV SCART inputs) for RGB video insertion is connected to the ADOC IC.

Sharpness functions are:
- Luminance Transient Improvement (LTI),
- Dynamic Peaking, and
- Digital Colour Transient Improvement (DCTI).

The panorama block does the non-linear scaling for displaying 4:3 formats on a wide-screen display.

Colour enhancement functions are:
- Skin Tone Control,
- Blue Stretch, and
- Green Enhancement.

A colour Space Converter can convert the video signal from YUV to RGB format. The Frame Processing block can insert frames and borders such as a coloured frame around the Picture in Picture (PIP). Following figure shows the structure of the Back End Feature block.

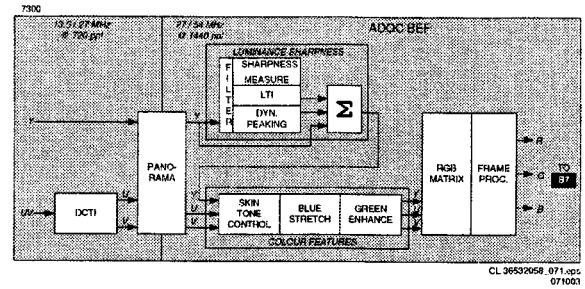

Figure 9-13 BEF block diagram

Digital Output Processor (DOP)

The DOP is a display processor block, and contains the following functions:
- **RGB control processor** with linear RGB input for the main video signal, a linear RGB input for OSD/text signals with blending, and an RGB output stage with black current stabilisation which is realised with the continuous cathode calibration (2-point black current measurement) system.
- **Programmable deflection processor**, driven by an external crystal clock, which generates the drive signals for the horizontal, east-west, north-south and vertical deflection with extensive geometry correction capabilities.
- The circuit can be used in both single scan (50 or 60 Hz) and double scan (100 or 120 Hz) applications.

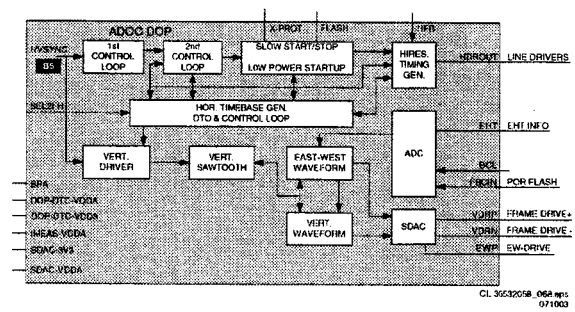

Figure 9-14 DOP block diagram

RGB Control Processing

- The RGB control circuit of the DOP contains two sets of input signals:
  - The first RGB input (RGB), 10 bits wide, is intended for the normal video signals coming from the BEF part. The "RGB" signals will first enter a contrast control stage, followed by a brightness control stage, both influenced by a combination of user control, Beam Current Limiter and Peak White Limiter, followed by a soft clipper stage. Then the signal will be applied to the blender stage. The blender input signal will be used as an input for the peak white limiting system.
  - The second RGB input (GFX), 4 bits wide, is intended for OSD and Teletext signals. The switching between the internal signal and the OSD signal is realised via a blending function. The "GFX" input signals will be re-formatted to 10 bit wide internally before entering the Beam Current Control brightness correction stage, followed by the hard clip stage. Then the signal will also be applied to the blender stage.
- The two input data streams are combined into one stream by the blender. This blender is controlled by a third data stream.
- The next block is the "Drive Adjust" part. It contains a Picture Tube Biasing system, a Beam Current Control, and Peak White Limiting part.

In order to enhance the spatial bandwidth of the CRT display, Scan Velocity Modulation (SCAVEM) is implemented on the CRT-panel.

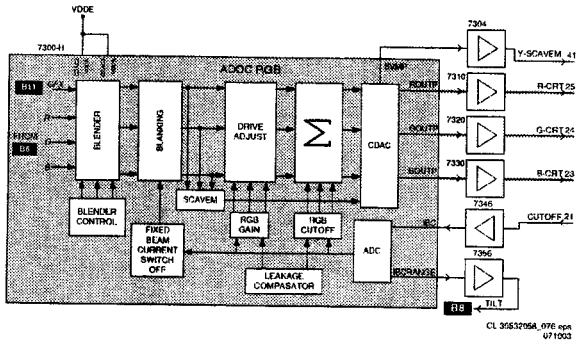

Figure 9-15 ADOC RGB control block diagram

Synchronisation and Deflection Processing

- **Horizontal synchronisation and drive circuit.** The horizontal drive signal is obtained from an internal oscillator, which runs at a fixed frequency of 54 MHz. This oscillator is synchronised to the incoming horizontal H_D pulse by means of a digital PLL. The horizontal drive signal is generated by a second control loop, which compares the phase of the reference signal, applied from the internal DTO, to the horizontal flyback pulse HFB.
- **Vertical deflection and drive circuit.** The drive signals for the vertical and E/W deflection circuits are generated by a vertical divider, which derives its reference signal from the Horizontal Time base Generator. This divider is synchronised by the incoming V_D pulse, generated by the input processor or the Feature Box. The vertical drive output is realised by a differential voltage, which is generated by SDACs. The outputs must be DC-coupled to the vertical output stage (TDA8177, item 7620 on the LSP).

See also figure "DOP block diagram"

9.5 Synchronisation

9.5.1 Sync Flow

The CVBS signal on the SCART1 connector (CVBS-SC1_AV1-IN system signal path; designated as EXT 1 CVBS) is used to provide synchronisation for the EXT1 RGB input. Besides providing synchronisation for RGB source, EXT1 CVBS is also required for SCART2 CVBS output.

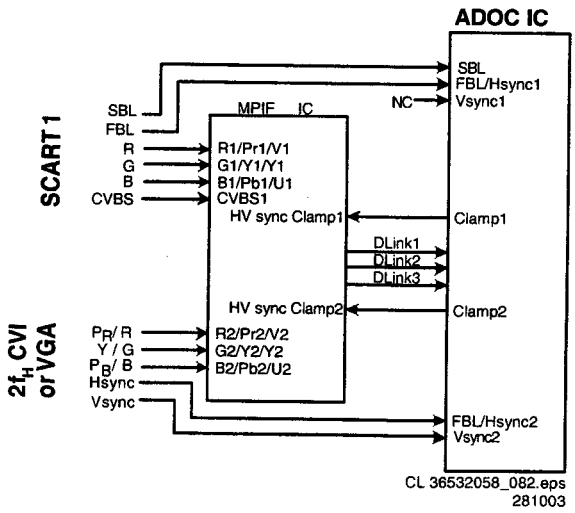

Figure 9-16 Sync flow block diagram

For 1fH CVI input, synchronisation is derived from sync-on-Y. For the 2fH CVI input, synchronisation signal is derived from sync-on-Y input or the H_SYNC/V_SYNC.
In case of VGA input, synchronisation signal is taken from H_SYNC and V_SYNC inputs

9.6 Audio

9.6.1 Introduction

Sound IF processing, audio source selection, and audio analogue-digital signal conversions are done in the MPIF IC. SIF demodulation, sound system auto-detection, audio base-band, and headphone processing is done in the ADOC IC. Therefore, the ADOC contains a digital TV sound processor for analogue and digital multi-channel sound systems in TV sets. By hardware programming, several applications can be scaled.

The sound processing of the SALSA system can be split into three parts:

- Initial source selection and analogue to digital conversion performed by MPIF.
- Demodulator and Decoder (DEMDEC) performed by the ADOC.
- Back End Features (BEF) performed by the ADOC.

9.6.2 MPIF Sound part

The (main) Tuner receives an RF signal and converts it to IF. Via the appropriate SAW filters, the SIF signal is delivered to the QSS mixer stage of the MPIF IC and if channels according to standard L/L' are received also to the AM demodulator. The Quasi Split Sound demodulation generates the SSIF or intercarrier signal. By the SSIF switch, it is possible to choose between the internally derived intercarrier and an external second SIF (e.g. from a PIP front end or 10.7 MHz radio). The selected SSIF passes some anti-alias filtering, is amplified in an AGC amplifier and is then converted from analogue to digital (SSIF AGC/ADC). Together with other signals, the digitised SSIF is transferred via an I2D-Link to the ADOC IC.
The audio signal out of the AM demodulator is connected to the analogue X-bar in the MPIF IC. All other inputs to this multiplexer/audio switch come from external, either from the PIP front end (AMEXT/PIPMONO) or SCART/CINCH (AUDxin) or the DAC1, DAC2 output signals from ADOC. The audio AD converters are digitising the audio signals foreseen for further digital processing in ADOC. Three stereo outputs (AUDx out, LINE out) are available for connections to SCART/CINCH sockets.
The sound part of ADOC consists of the demodulator/decoder (DEMDEC), sample rate conversion (SRC), a digital input X-bar, the digital audio processing for the loudspeaker, headphone and DAC channels, the I2S processing and interfacing as well as the DA conversion. This part will be described in the next chapter.

9.6.3 ADOC Sound part

Introduction
The ADOC sound part contains two DSP cores as shown in the block diagram. The first core called DEMDEC-DSP is combined with DEMDEC (Demodulation/Decoding) hardware and the second core is the AUDIO-DSP. The DEMDEC-DSP is used for the decoder and demodulator tasks, plus the sample rate conversion.
The AUDIO-DSP is used for the sound features, from the level adjust unit up to the output cross bar. Audio DACs and I2S hardware (optional) are converting the processed signals to analogue or digital audio.

All I2D data links carry sound signals. The data link processing splits them from the other signals as video so that the DEMDEC block receives the second sound IF (SSIF) and the audio

signals from the audio ADCs of the MPIF IC. The SSIF needs some hardware processing before it enters the DEMDEC DSP. The DEMDEC processing will be described in the next chapter. The audio signals from the audio ADCs of the MPIF are passing the DEMDEC DSP only for source selection and sample rate conversion.
In this chassis, two of the DAC **outputs** are used to feed a headphone. Two other DAC stereo outputs are provided for the audio feedback to the MPIF IC. They are located to pins of the ADOC that suit best for connection to MPIF.

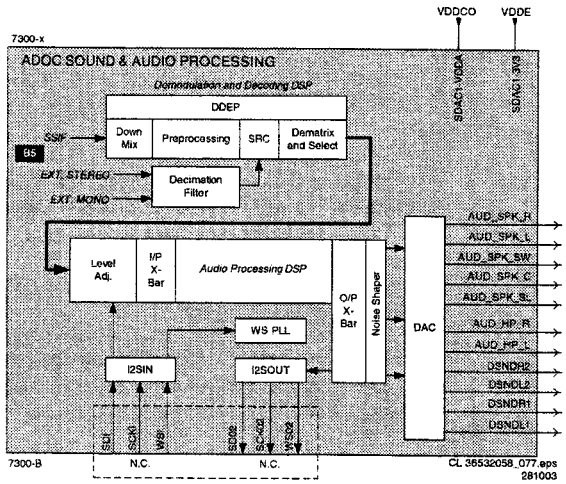

Figure 9-17 ADOC sound processing block diagram

DEMDEC DSP
The output signals of the above-mentioned hardware blocks, plus four audio ADC channels are read in by the DEMDEC DSP, processed, converted to the current audio sample rate, "demultiplexed", and forwarded to the Audio DSP for further processing (volume, tone control, effects etc.).

Down Mixer
The digitised SSIF input signal is fed to the mixers, which mix one or both input sound carriers down to zero IF.

Pre-processing
This part contains the sound system identification and demodulation circuitry.

Audio Sample Rate Conversion (SRC)
All input signals pass through a sample rate conversion to the actual output sample rate (usually 48 kHz) such that the output rate does not need to be synchronised with any of the input rates. Up to five separate channels can be converted.

Audio Processing DSP
This block applies several filters, like down-sampling and de-emphasis, noise reduction processing, performs a sample rate conversion (SRC) to the current audio sample rate, and routes the decoded signals to the output channels.
The generic processing controls are Volume, Bass, Treble, Balance, Incredible Surround, Spatial (incredible mono), DBE, Dynamic Ultra Bass II (for non-woofer sets only), AVL, Sub-Woofer, and 5-band Graphic equaliser.
The Headphone volume can be separately controlled in the Headphone menu without affecting the master volume (the setting of the volume tables will be adapted after fine tuning). For variable volume output for USA, the DAC1 output will switch to the Main channel and therefore the same volume curve for the Main Channel can be used.

9.6.4 Audio Amplifier

Speakers (diagram A6)
The audio output stage is built around IC7701 , which is a balanced amplifier, and is located on the LSP. It uses an monolithic integrated power amplifier IC, the TDA7497. The gain of the amplifier is constant. This means that volume control is done via the ADOC.
The supply voltage is +28 V, generated by the power supply via L5506 (or L5512). The TDA7497 delivers an output of 3 x 10 W_rms to two full range speakers and an (optional) subwoofer.

Muting
There are three types of muting available: system mute, headphone status mute, and user mute.

- **System mute.** System muting is implemented for "special events" such as channel/source change event, loss of identification signal, "on/off" switching of the set, during search and auto store/program, and/or sound mode change. This muting is transparent to the user. Audio output is muted before the above "special events" occurred, to prevent problems such as audible plop. Muting is done via the SOUND-ENABLE (software controlled) and/or POR (hardware controlled) line connected (via TS7710 and 7711) to pin 10 of the amplifier-IC and coming from the ADOC microprocessor.
- **Headphone status mute.** A headphone status is available to detect the presence of the headphone and mute the main speakers if the headphone is detected. The microprocessor will read the FRONT-DETECT status.
- **User mute.** This is a mute option available to the user. The user select the MUTE option on the remote control to switch "off/on" the sound output to the main loudspeaker and the (optional) subwoofer.

Headphone amplifier (diagram A7)
The headphone amplifier is built around IC7751 (NJM4556), which is a high-gain, high output current dual operational amplifier. The supply voltage is +5 V.

9.7 Control

9.7.1 Introduction

The MIPS processor within the ADOC performs the control of the complete SALSA system. This part of the document will examine the functions that enable the MIPS to operate and control the remainder of the SALSA system.

Some control features:

- MIPS1910 processor (MIPS).
- Embedded SRAM.
- External Bus Interface Unit (EBIU) for external memory access.
- SDRAM Interface.
- Interrupt Controller.
- Power and Clock management.
- General Purpose I/O (GPIO).
- Analogue to Digital conversion.
- Two x I2C master/slave.
- Two x General Purpose Timers.
- UART.
- Two x Multi-standard VBI Data Capture Unit.
- EJTAG (for debug and boundary scan functions).
- Remote Control (Infra Red) pre-processing.
- Graphics.

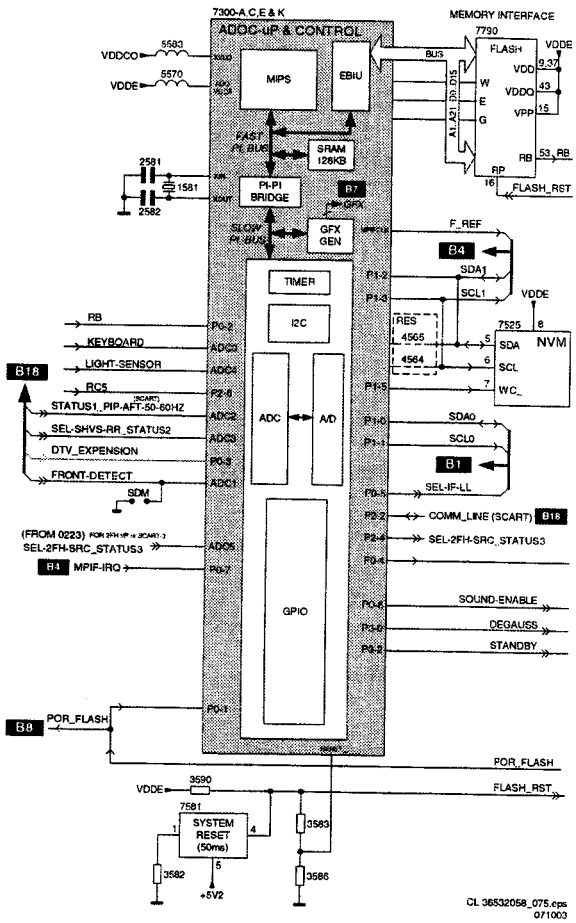

Figure 9-18 ADOC control block diagram

9.7.2 Internal Bus Structure

PI Bus

The Peripheral Interconnect (PI) bus connects all of the functional blocks within the ADOC device. Physically it is split into four distinct sections. These are referred to as:

- Fast PI Bus.
- Slow PI Bus.
- Video PI Bus.
- Sound PI Bus.

The individual segments of the PI bus are interconnected via PI-PI bridges. When several devices are connected to a bus system section only one of these may have control (ownership) of the bus section at any instant in time. The device that has control is referred to as the bus master, the remaining devices are referred to as slaves. Each bus segment section has a Bus Control Unit (BCU), which allocates bus ownership to the various modules that are capable of being bus masters. A bus master may have ownership of one or more sections of the PI bus.

Extension Bus Interface Unit

The Extension Bus Interface Unit (EBIU) allows various types of memory (ROM/FLASH/SRAM) to be attached to the ADOC IC and must therefore be configured per memory type (in terms of chip select lines, bus width used, and access times). This enables the hardware of the EBIU to correctly address the external memories and apply the correct number of wait states.

9.7.3 Microprocessor Reset

The reset of the device is split between three functions:

- Power-On-Reset (POR). Output is fed to the Power Clock Reset (PCR) block generating a Hard reset (all functions reset).
- PCR. In simplified terms two outputs are available:
  - Hard reset, all blocks within ADOC are reset.
  - Soft reset, a limited number of blocks within the control core are reset.
- GP registers are used to allow software control of the reset to certain blocks within ADOC.

9.7.4 External Bus Structure

I2C Bus

The system has two system I2C buses; one for the devices on the SSB and the other for the devices used in the external modules .

- The **I2C-1** system bus, comprises of SCL and SDA, is used to control all the I2C devices on the LSP (the main tuner) and other I2C devices connected to other external panels (PIP Front-End demodulation IC, PIP tuner, etc.). The I2C-1 is a 100 kHz bus and is called as "slow" bus. It is connected to the +5V supply. All these devices are powered down in the Standby mode.
- The **I2C-2** system bus, comprises of SCL2 and SDA2, is used to control all the I2C devices (MPIF, 3D-Comb, NVM, etc.) present on the SSB. The I2C-2 is a 400 kHz bus and is called as "fast" bus. It is connected to the +3.3V supply.

9.8 Protections

For a detailed description, see chapter 5 "Service Modes, Error Codes, and Fault Finding".

9.9 Software Upgrading

In this chassis, you can **upgrade** the software via ComPair. This offers the possibility, to replace the entire SW image without having to remove the flash-RAM from its socket. You can find more information on how this procedure works in the ComPair file. It is possible that not all sets are equipped with the hardware, needed to make software upgrading possible. To speed up the programming process, the firmware of the ComPair interface can be upgraded. See Chapter "Service Modes ..."; paragraph "ComPair" - "How To Order" for the order number.

9.10 Abbreviation list

Table 9-1 Abbreviations

Abbreviation	Description
0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16:9 format, 12 = play 4:3 format
2CS	2 Carrier Stereo
A2	Commonly known as two carriers sound (2CS) system
AC (or ac)	Alternating Current
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
ADOC	Analogue Digital One Chip
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic gain control (feedback) signal to the tuner.
AM	Amplitude Modulation
ANR	Automatic Noise Reduction: one of the algorithms of Auto TV
AP / A/P	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ASD	Automatic Standard Detection
AV	External Audio Video
AVL	Automatic Volume Level control
B	Blue
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BBD	Black Bar Detection
BCL	Beam Current Limiter
BC-PROT	PROTection signal to the microprocessor for a too high Beam Current.
BG	System B and G
BLC-INFO	BLack Current INFO
BLD	Black Level Detection
BS	Black Stretch
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
C	Chroma (video) / Centre channel (audio)
CL	Constant Level: audio output to connect with an external amplifier
CLUT	Colour Look Up Table
ComPair	Computer aided rePair
CRT	Cathode Ray Tube or picture tube
CSM	Customer Service Mode
CTI	Colour Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
CVI	Component Video Input
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DC (or dc)	Direct Current
DCC	Dynamic Contrast Control
DC-filament	Filament supply voltage
DEGAUSS	Control line. Logic LOW to enable CRT degaussing. Logic HIGH to disable the CRT degaussing.
DFU	Directions For Use: owner's manual
DNR	Digital Noise Reduction: noise reduction feature of the set
DOP	Digital Output Processor (Part of ADOC which takes care of RGB control and delection)
DPL	Dolby Pro Logic
DRAM	Dynamic RAM
DS	Digital Scan
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode (a DST-emulator is available in ComPair)
DTS	Digital Theatre Sound
DVD	Digital Versatile Disc
DVI(-d)	Digital Visual Interface (d= digital only)
DW	Double Window
DYN-FASE-COR	Dynamic phase correction, to correct the phase of the H-drive
EEPROM	Electrically Erasable and Programmable Read Only Memory
EHT	Extra High Tension
EHT-INFO	Extra High Tension INFOrmation, used for contrast reduction, vertical and horizontal amplitude correction, beam current protection, and flash detection
EMI	Electro Magnetic Interference
EPG	Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTView)
EPLD	Erasable Programmable Logic Device
EU	Europe
EW	East West, related to horizontal deflection of the set
EW-DRIVE	East -West correction drive signal.
EXT	EXTernal (source), entering the set by SCART or by Cinches (jacks)
FBL	Fast BLanking: DC signal accompanying RGB signals
FBX	Feature Box: module which contains 100 Hz processing, Pixel Plus, and AutoTV algorithms (FBX6= based on PICNIC, FBX7= based on PICNIC and Eagle)
FE	Front End
Field	Each interlaced broadcast FRAME is composed of two Fields, each Field consists of either Odd or Even lines
FILAMENT	Filament of CRT
FLASH	FLASH memory
FM	Field Memory / Frequency Modulation
FM Radio	Audio receiver which can receive the FM Band 87.5 - 108 MHz
FMR	FM Radio
Frame	A complete TV picture comprising of all lines (625/525)
FRAMEDRIVE -	Differential frame (vertical) drive signal (negative)
FRAMEDRIVE+	Differential frame (vertical) drive signal (positive)
FRC	Frame Rate Converter
FRONT-DETECT	Control line for detection of headphone insertion, Service Mode jumper, power failure detection.
FRONT-Y_CVBS	Front input luminance or CVBS (SVHS)
G	Green
Gb/s	Giga bits per second
H	H_sync to the module
H_2FH	Horizontal sync input for the 2fH source.
H_A50	Horizontal Acquisition 1fH: horizontal sync pulse coming out of the HIP
H_D100	Horizontal Drive 2fH: horizontal sync pulse coming out of the feature-box
H_DRIVE	Horizontal Drive
H_FLYBACK	Horizontal Flayback
H_OUT	H_sync output of the module
H_OUT	Horizontal Output pulse
HA	Horizontal Acquisition: horizontal sync pulse coming out of the BOCMA
HD	High Definition
HEADPHONE -L	Stereo headphone (Left) signal output.
HEADPHONE -R	Stereo headphone (Right) signal output.
HFB	Horizontal Flyback Pulse: horizontal sync pulse from large signal deflection
HP	HeadPhone
HW	Hardware
I	Monochrome TV system. Sound carrier distance is 6.0 MHz
I2C	Integrated IC bus (same as IIC)
I2S	Integrated IC Sound bus
IC	Integrated Circuit
IDRIVE-	Vertical drive -
IDRIVE+	Vertical drive +
IF	Intermediate Frequency
IF-TER	IF signal from main tuner
IIC	Integrated IC bus (same as I2C)
Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker.
IO	In/Out
IR	Infra Red
IROM	Internal ROM (inside uP)
IRQ	Interrupt ReQuest
ITV	Institutional TV
JTAG	Joint Test Action Group. Definition for a standardised serial test interface
KEYB	Front panel keyboard
KEYBOARD	Input line: carries the voltage value of the corresponding tact switch on TOP-control or FRONT-control keypad
L	Left audio channel

Abbreviation	Description
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at startup of the set to configure it according to the customer's preferences
LATAM	Latin America
LCD	Liquid Crystal Display
L-CL_VLOUT	REAR CINCH stereo output
LED	Light Emitting Diode
LFE	Low Frequency Enhancement audio channel
L-FRONT-IN	EXT3 stereo input
LIGHT-SENSOR	Ambient light intensity signal.
LINE DRIVE	Line drive signal (for the Line transistor)
LINEDRIVE1	Horizontal (line) deflection drive signal.
LNA	Low Noise Adapter / Low Noise Amplifier
LOT	Line Output Transformer
LPD	LG.Philips Displays
LS	Loudspeaker
Ls, Rs	Left surround and Right surround channel (audio)
LSP	Large signal panel
Lt, Rt	Left total and Right total in case of a Dolby ProLogic encoded signal (audio)
LTI	Luminance Transient Improvement
LTP	Luminance Transient Processor
LUT	Look Up Table
LVDS	Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication.
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
Mb/s	Mega bits per second
MCS	Multi Channel Sound: refers to Dolby Pro Logic Surround in A02 ADOC
MDO	Mode control data output
MIPS	Microprocessor without Interlocked Pipeline-Stages. A RISC-based microprocessor.
Mips	Million instructions per second
MMI	Multi Media Interface
MOSFET	Metal Oxide Semiconductor Field Effect Transistor
MPEG	Motion Pictures Experts Group
MPIF	Multi Platform InterFace (Part of Salsa chipset, sister-chip of ADOC IC)
MPIP	Multi Picture in Picture: commercial feature showing several frozen or moving pips
MPX	MultiPleX
MSP	Multi-standard Sound Processor: ITT sound decoder
MUTE	MUTE Line
NAFTA	North American Free Trade Area (NAFTA & USA are used interchangeable)
NC	Not Connected
NDF	No vertical Deflection: vertical fly back protection
NHF	No Horizontal deflection: horizontal fly back protection
NICAM	Near Instantaneously Companded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
NTC	Negative Temperature Coefficient, non-linear resistor
NTSC	National Television Standard Committee. Colour system mainly used in North America and Japan. Colour carrier NTSC M/N= 3.579545 MHz, NTSC 4.43= 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
NVM	Non Volatile Memory: IC containing data such as alignments, stations
O/C	Open Circuit
OB	Option Byte
OC	Open Circuit
ON/OFF LED	On/Off control signal for the LED
ON/STBY	On/Standby
ON-OFF-LED	Active-LOW control line. Logic LOW = red LED on, HIGH = red LED off.
OP	Option Byte
OSD	On Screen Display
P50	Project 50: communication protocol between TV and peripherals
PAL	Phase Alternating Line. Colour system mainly used in West Europe (colour carrier= 4.433619 MHz) and South America (colour carrier PAL M= 3.575612 MHz and PAL N= 3.582056 MHz)
PC	Personal Computer
PCB	Printed Circuit Board (same as "PWB")
PCM	Pulse Code Modulation
PILOT	Pilot Signal

Abbreviation	Description
PIP	Picture In Picture
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
POR	Power On Reset, signal to reset the microprocessor
POR_FLASH	Signal that informs the micro controller (painter) that set will switch off
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
PTC	Positive Temperature Coefficient, non linear resistor
PTP	Picture Tube Panel
PWB	Printed Wiring Board (same as "PCB")
PWM	Pulse Width Modulation
QSS	Quasi Split Sound
R	Right audio channel
R	Red
RAM	Random Access Memory
RC	Remote Control transmitter
RC5	Remote Control system 5, the signal from the remote control
RC5 / RC6	Signal protocol from the remote control receiver
RDS	Radio Data System
RESET	RESET signal
RF	Real Flat / Radio Frequency
RGB	Red, Green, and Blue. The primary colour signals for TV. By mixing levels of R,G, and B, all colours (Y/C) are reproduced.
RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync
RISC	Reduced Instructions Set Computer
RMS	Root Mean Square value
ROM	Read Only Memory
S	Surround channel or mono surround channel (audio)
S/C	Short Circuit
S/PDIF	Sony Philips Digital InterFace
SALSA	System Application for Low Segment of Analogue TV
SAM	Service Alignment Mode
SAP	Second Audio Program
SAW	Surface Acoustics Wave
SC	SandCastle: two-level pulse derived from sync signals / SCART
SCART	Syndicat des Constructeurs d'Appareils Radiorecepteurs et Televisieurs
SCAVEM	Scan Velocity Modulation
SCL	Serial Clock I2C
SCL-F	CLock Signal on Fast I2C bus
SD	Standard Definition
SDA	Serial Data I2C
SDA-F	Data Signal on Fast I2C bus
SDAM	Service Default / Alignment Mode
SDRAM	Synchronous DRAM
SECAM	SEequence Couleur Avec Memoire: Colour system mainly used in France and East Europe. Colour carriers= 4.406250 MHz and 4.250000 MHz
SEL	Control signal
SIF	Sound Intermediate Frequency
SIMM	Single In-line Memory Module: 80-fold connector between LSP and SSB
SL	Audio Surround Left
SLDP	Smart Local Dooming Prevention (HW and SW)
SMC	Surface Mounted Compoments
SMPS	Switched Mode Power Supply
SND	SouND
SNERT	Synchronous No parity Eight bit Reception and Transmit
SOG	Sync On Green
SOPS	Self Oscillating Power Supply
SOUND-ENABLE	Control line to do hardware mute or un-mute of loudspeakers.
SR	Audio Surround Right
SRAM	Static RAM
SS	Small Screen
ST_BY	Standby
STANDBY (POR)	Signal coming from Main Supply informing the supply is switching off
STATUS	Status signal from pin 8 on SCART connector
STBY	Standby
SURR	Surround (mono) signal
SVHS	Super Video Home System
SW	Software / Subwoofer
SW1	Switch 1
TBD	To Be Defined

Abbreviation	Description
THD	Total Harmonic Distortion
TILT	PWM Output signal (variable DC level) to control the picture tilt from the DOP block of the ADOC.
Trinorma	Video standard, combination of PAL N, PAL M, NTSC M
TXT	Teletext
TXTSW	Teletext switch
U_100	U from Feature Box
UART	Universal Asynchronous Receiver Transmitter
UBE	Ultra Bass Enhancement
uC	Micro controller
UI	User Interface
UOC	Ultimate One Chip
uP	Microprocessor
UV	Colour difference signals
V	V_sync
V_100	V from Feature Box
V_2FH	Vertical sync input for the 2fH source.
V_A50	Vertical Acquisition 1fH
V_AMP	Vertical Amplitude DAC output
V_BAT	Main supply for deflection (usually 141 V)
V_D100	Vertical Drive 2fH: vertical sync pulse from deflection
V_DNEG	One of the symmetrical drive signals for the DC frame output stage.
V_DPOS	One of the symmetrical drive signals for the DC frame output stage.
V_OSD	Vertical OSD
VA	Vertical Acquisition
VBI	Vertical Blank Interval
V-chip	Violence chip
VCR	Video Cassette Recorder
VD	Vertical Drive: vertical sync pulse coming from the feature box
VDS	Virtual Dolby Surround
VERT	Vertical Output pulse
VESA	Video Electronics Standards Association
VGA	Video Graphics Array: 640x480 (4:3)
VGND	Video ground
VGUARD	Vertical guard voltage
VIF	Video Intermediate Frequency
VL	Variable Level out: processed audio output toward external amplifier
VMEM	Voltage supplied for EEPROM
VMICRO	Power supply for micro controller
VOL	Volume
VSYNC	Pulse derived of 530 s-circuit behind the HOP, to vertically synchronize the Painter
WD	Watch Dog
WE-NVM	NVM write enable control line.
WS	Wide Screen
WSS	Wide Screen Signaling, used by broadcasters to transmit e.g. PALPLUS and Aspect Ratio
WST	World System Teletext
WXGA	1280x768 (15:9)
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
XGA	Extended Graphics Array: 1024x768 (4:3)
XTAL	Quartz crystal
Y	Luminance signal
YC (or Y/C)	Luminance (Y) and Chrominance (C) signal (analogue video encoding format)
YPbPr	Component video (Y= Luminance, Pb/ Pr= Colour difference signals)
YUV	Component video

9.11 IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs). This is not applicable to this manual.

10. Spare Parts List

Large Signal Panel [A]

Various

0080	4822 492 70789	Transistor clamp
0136	3104 301 24181	Spring for Bracket
0137	3104 301 24181	Spring for Bracket
0138	4822 255 41371	Transistor clamp
0139	4822 492 62076	Transistor clamp
0261	3104 304 10661	Cable clamp
0262	3104 304 10722	Cable clamp
0320	4822 255 41371	Transistor clamp
0341	4822 492 70788	IC clamp
0389	4822 492 70789	Transistor clamp
0395	4822 492 70789	Transistor clamp
0396	4822 492 70789	Transistor clamp
1205	2422 025 17242	Connector 80p f
1417	4822 265 20723	Connector 2p m
1424	2422 025 11244	Connector 7p m
1491	4822 267 10973	Connector 1p m
1498	2422 025 04849	Connector 2p m
1499	2422 025 04849	Connector 2p m
1501	4822 070 35002	Fuse 5A
1502	4822 267 10774	Connector 2p m Rd
1503	4822 070 12502	Fuse 2.5A
1505	2422 025 16374	Connector 2p m
1511	4822 265 11253	Fuse holder 2p
1512	4822 265 11253	Fuse holder 2p
1550	2422 132 07411	Relay 1p 5V 5A
1590	4822 252 60151	Sparkgap dsp501
1591	4822 252 60151	Sparkgap dsp501
1601	2422 086 10919	Fuse 65V 125mA
1620	4822 267 10735	Connector 3p m
1625	2422 025 16382	Connector 3p m
1735	4822 267 10565	Connector 4p
1901	4822 267 10771	Socket 2 x SCART
1902	4822 267 10982	Connector 2p
1936	2422 025 12485	Connector 11p m
1940	2422 025 12485	Connector 11p m
1943	4822 267 10748	Connector 3p m
1945	4822 267 10735	Connector 3p m
1947	4822 267 10734	Connector 5p m
8000	3104 311 03272	Cable 640mm EHT
8193	4822 320 20216	Focus cable 364 mm
8194	4822 320 20189	Cable HT-focus 44cm Rd
8417	3104 311 04561	Cable 2p3/400/2p3
8424	3104 311 02991	Cable 7p/560/7p Wh
8625	3104 311 03101	Cable 3p/560/3p Bk
8625	3104 311 06261	Cable 2p/560/2p3 HR BK INS
8936	3104 311 04121	Cable 11p/680/11p INS
8936	4822 320 12514	Cable 11p 680mm
8940	3104 311 01161	Cable 11p/340/11p Bk
8940	4822 323 10458	Cable 11p 480mm HR WH

⊣⊢

2100	4822 126 13841	1nF 20% 250V
2101	4822 121 51598	2.2nF 5% 400V
2102	4822 124 40248	10µF 20% 63V
2103	2020 552 94427	100pF 5% 50v 0603
2104	4822 123 14025	2200µF 20% 16V
2105	2020 552 94427	100pF 5% 50v 0603
2107	4822 121 43855	3.3nF 5% 400V
2108	4822 121 70162	10nF 5% 400V
2109	4822 126 14472	1µF 10% 10V 0805
2110	4822 126 14472	1µF 10% 10V 0805
2111	4822 121 43526	47nF 5% 250V
2112	5322 126 11583	10nF 10% 50V 0603
2115	4822 124 40764	22µF 100 V
2116	4822 126 13682	100pF 5% 1kV
2118	4822 124 80061	1000µF 20% 25V
2119	4822 123 14025	2200µF 20% 16V
2120	4822 126 13862	1.5nF 10% 2kV
2126	4822 123 14025	2200µF 20% 16V
2130	5322 126 11583	10nF 10% 50V 0603
2131	4822 126 13881	470pF 5% 50V
2132	4822 126 10206	2.2nF 10% 500V
2140	4822 124 40248	10µF 20% 63V
2141	4822 124 40248	10µF 20% 63V
2143	4822 126 10206	2.2nF 10% 500V
2144	4822 126 14472	1µF 10% 10V 0805
2145	4822 126 13881	470pF 5% 50V
2147	3198 017 31530	15nF 20% 50V 0603
2148	4822 126 13599	3.3nF 10% 500V
2149	4822 126 14472	1µF 10% 10V 0805
2150	5322 126 11583	10nF 10% 50V 0603
2153	5322 126 11582	6.8nF 10% 63V
2154	4822 126 14549	33nF 16V 0603
2161	2020 558 90556	680pF 10%b 1kV
2161	4822 126 14152	680pF 10% 1kV
2163	2222 338 22104	100nF 20% 275V
2200	4822 124 40248	10µF 20% 63V
2201	4822 126 13879	220nF 20% 16V
2202	4822 126 13473	220nF 80-20% 50V
2203	4822 124 41584	100µF 20% 10V
2400	4822 124 11936	47µF 20% 160V
2401	4822 121 42077	6.8nF 10% 400V
2402	4822 124 12373	47µF 20% 250V
2403	2238 916 15641	22nF 10% 25V 0603
2404	2238 916 15641	22nF 10% 25V 0603
2405	4822 126 13841	1nF 20% 250V
2412	3198 024 44730	47nF 50V 0603
2413	4822 124 12255	10µF 20% 50V
2414	3198 024 44730	47nF 50V 0603
2415	4822 126 13883	220pF 5% 50V
2417	4822 126 14076	220nF 25V. 20%
2419	4822 126 14237	470pF 10% 2kV
2420	4822 121 70581	1.5nF 5% 2kV
2420	4822 121 70594	1nF 5% 2kV
2421	2038 301 00312	1.2µF 5% 250V
2421	4822 121 42634	560nF 5% 250V
2425	4822 121 10526	9.1nF 5% 2kV
2425	4822 121 70435	10nF 5% 2kV
2426	4822 121 10653	22nF 5% 630V
2430	4822 126 10206	2.2nF 10% 500V
2431	4822 126 10206	2.2nF 10% 500V
2433	2022 333 00087	510nF 5% 250V
2433	2022 333 00163	360nF 5% 250V
2440	2020 552 96448	1µF 10% 16V
2443	9965 000 09661	470pF 50V 10%
2448	5322 122 32268	470pF 5% 63V
2450	4822 121 42408	220nF 10% 50V
2450	5322 121 42578	100nF 5% 250V
2451	2020 012 93757	1000µF 20% 10V
2454	3198 017 31530	15nF 20% 50V 0603
2455	5322 126 11578	1nF 10% 50V 0603
2457	4822 126 13188	15nF 5% 63V
2458	4822 126 14241	330pF 50V 0603
2460	4822 124 81144	1000µF 16V
2461	4822 122 31169	1.5nF 10% 500V
2461	4822 126 11524	1.5nF 10% 1kV
2462	4822 124 11767	470µF 20% 25V
2463	4822 122 31177	470pF 10% 500V
2464	4822 124 11767	470µF 20% 25V
2465	4822 122 31177	470pF 10% 500V
2466	2238 586 59812	100nF 20-80% 50V 0603
2468	4822 122 31177	470pF 10% 500V
2480	5322 126 11582	6.8nF 10% 63V
2482	3198 017 34730	47nF 16V 0603
2483	3198 017 31530	15nF 20% 50V 0603
2490	4822 124 41584	100µF 20% 10V
2491	4822 124 81151	22µF 50V
2492	4822 124 41584	100µF 20% 10V
2494	2238 780 15654	220nF 10% 16V
2495	2238 780 15654	220nF 10% 16V
2496	2238 586 59812	100nF 20-80% 50V 0603
2497	4822 126 12105	33nF 5% 50V
2498	2020 552 96448	1µF 10% 16V
2499	5322 126 11579	3.3nF 10% 63V
2501	4822 126 13449	1nF 10% 2KV
2501	4822 126 14053	1nF 10% 2kV
2503	5322 121 42489	33nF 5% 250V
2504	2238 916 15641	22nF 10% 25V 0603
2505	2020 554 90169	470pF 20% 250V
2507	2222 338 22474	470nF 20% 275V
2508	4822 124 11913	22nF 20% 275V
2509	4822 124 11913	22nF 20% 275V
2510	4822 126 12263	220pF 10% 2kV
2512	4822 124 12056	1000µF 20% 35V
2513	4822 126 13881	470pF 5% 50V
2514	4822 126 14238	2.2nF 50V 0603
2515	4822 124 80096	47µF 200V
2516	2222 057 36221	220µF 20% 400V 057
2518	4822 122 31211	100pF 10% 500V
2519	4822 126 10206	2.2nF 10% 500V
2524	5322 126 11583	10nF 10% 50V 0603
2525	4822 126 14247	1.5nF 50V 0603
2526	2020 558 90571	2.2nF 10% 1kV
2527	4822 126 14237	470pF 10% 2kV
2528	4822 126 14472	1µF 10% 10V 0805
2530	4822 126 14472	1µF 10% 10V 0805
2531	4822 122 31175	1nF 10% 500V
2532	4822 126 14472	1µF 10% 10V 0805
2533	2020 557 90732	4.7nF 10% 250V
2535	4822 126 13193	4.7nF 10% 63V
2537	4822 124 11913	22nF 20% 275V
2538	4822 122 33177	10nF 20% 50V
2540	4822 124 21913	1µF 20% 63V
2541	4822 122 31211	100pF 10% 500V
2544	4822 126 14238	2.2nF 50V 0603
2547	2222 338 22104	100nF 20% 275V
2601	2238 586 59812	100nF 20-80% 50V 0603
2603	4822 126 13883	220pF 5% 50V
2604	4822 126 13473	220nF 80-20% 50V
2605	4822 126 13883	220pF 5% 50V
2620	4822 126 13473	220nF 80-20% 50V
2621	2238 586 59812	100nF 20-80% 50V 0603
2622	4822 124 40255	100µF 20% 63V
2623	4822 126 14238	2.2nF 50V 0603
2624	4822 121 51252	470nF 5% 63V
2625	4822 121 51252	470nF 5% 63V
2627	5322 124 40641	10µF 20% 100V
2628	4822 124 40255	100µF 20% 63V
2630	4822 126 14491	2.2µF -20+80% 10V 0805
2631	4822 126 14491	2.2µF -20+80% 10V 0805
2633	5322 126 11579	3.3nF 10% 63V
2635	2238 586 59812	100nF 20-80% 50V 0603
2642	4822 124 40255	100µF 20% 63V
2653	2238 586 15628	2.7nF 10% 50V 0603
2653	5322 126 11579	3.3nF 10% 63V
2656	2238 916 15641	22nF 10% 25V 0603
2657	2238 916 15641	22nF 10% 25V 0603
2659	2238 916 15641	22nF 10% 25V 0603
2660	5322 126 11578	1nF 10% 50V 0603
2701	4822 126 14043	1µF 20% 16V
2702	3198 016 31020	1nF 10% 25V 0603
2703	4822 126 14043	1µF 20% 16V
2704	3198 016 31020	1nF 10% 25V 0603
2707	4822 126 14043	1µF 20% 16V
2708	4822 124 11767	470µF 20% 25V
2709	3198 026 51020	1000µF 50V 20%
2710	4822 126 14585	100nF 10% 50V
2711	4822 124 80061	1000µF 20% 25V
2712	3198 017 34730	47nF 16V 0603
2713	3198 017 34730	47nF 16V 0603
2714	4822 124 80061	1000µF 20% 25V
2715	3198 017 34730	47nF 16V 0603
2716	3198 017 34730	47nF 16V 0603
2722	4822 124 40255	100µF 20% 63V
2914	4822 124 40248	10µF 20% 63V
2915	4822 124 40248	10µF 20% 63V
2918	4822 126 14585	100nF 10% 50V
2940	4822 124 41584	100µF 20% 10V
2941	4822 126 14585	100nF 10% 50V
2942	4822 126 14585	100nF 10% 50V
2943	4822 126 14585	100nF 10% 50V
2945	4822 126 14491	2.2µF -20+80% 10V 0805
2946	4822 126 14491	2.2µF -20+80% 10V 0805
2947	4822 124 40769	4.7µF 20% 100V
2950	5322 126 11583	10nF 10% 50V 0603
2951	5322 126 11583	10nF 10% 50V 0603
2987	5322 122 31863	330pF 5% 63V
2989	5322 122 31863	330pF 5% 63V
2990	5322 122 31863	330pF 5% 63V
2991	4822 051 20333	33kΩ 5% 0.1W
2991	5322 122 32531	100pF 5% 50V
2992	5322 122 31863	330pF 5% 63V
2993	4822 051 20333	33kΩ 5% 0.1W
2993	5322 122 32531	100pF 5% 50V
2994	5322 122 31863	330pF 5% 63V
2995	5322 122 31863	330pF 5% 63V
2996	5322 122 31863	330pF 5% 63V
2997	5322 122 31863	330pF 5% 63V
2998	4822 051 20333	33kΩ 5% 0.1W
2998	5322 122 32531	100pF 5% 50V
2999	4822 051 20333	33kΩ 5% 0.1W
2999	5322 122 32531	100pF 5% 50V

-WW-

3101	4822 053 20475	4.7MΩ 5% 0.25W
3102	4822 050 21002	1kΩ 1% 0.6W
3103	4822 050 21002	1kΩ 1% 0.6W
3104	4822 116 52195	47Ω 5% 0.5W
3105	4822 050 11002	1kΩ 1% 0.4W
3106	4822 116 52256	2.2kΩ 5% 0.5W
3107	4822 116 52256	2.2kΩ 5% 0.5W
3108	2122 101 01363	2.2Ω 5%
3111	4822 053 10152	1.5kΩ 5% 1W
3113	4822 116 52186	22Ω 5% 0.5W
3114	4822 116 52219	330Ω 5% 0.5W
3115	4822 116 52257	22kΩ 5% 0.5W
3116	4822 116 52257	22kΩ 5% 0.5W
3117	4822 116 52195	47Ω 5% 0.5W

3118	2122 101 01363	2.2Ω 5%
3120	4822 051 20109	10Ω 5% 0.1W
3123	4822 116 52176	10Ω 5% 0.5W
3124	4822 116 52199	68Ω 5% 0.5W
3125	4822 116 52182	15Ω 5% 0.5W
3126	4822 050 21003	10kΩ 1% 0.6W
3127	4822 116 52289	5.6kΩ 5% 0.5W
3130	4822 051 30479	47Ω 5% 0.062W
3131	4822 051 20471	470Ω 5% 0.1W
3132	4822 051 20479	47Ω 5% 0.1W
3133	4822 117 12925	47kΩ 1% 0.063W 0603
3134	4822 051 30102	1kΩ 5% 0.062W
3135	4822 051 30101	100Ω 5% 0.062W
3136	4822 051 30109	10Ω 5% 0.062W
3137	4822 050 24702	4.7kΩ 1% 0.6W
3138	4822 051 20105	1MΩ 5% 0.1W
3140	4822 051 20223	22kΩ 5% 0.1W
3141	4822 116 52263	2.7kΩ 5% 0.5W
3142	4822 051 30332	3.3kΩ 5% 0.062W
3143	4822 051 30101	100Ω 5% 0.062W
3144	4822 053 10221	220Ω 5% 1W
3150	4822 117 11373	100Ω 1% 0805
3151	4822 051 30109	10Ω 5% 0.062W
3152	4822 051 30102	1kΩ 5% 0.062W
3153	4822 051 20472	4.7kΩ 5% 0.1W
3155	4822 051 30101	100Ω 5% 0.062W
3156	5322 117 13017	100Ω 1% 0.063W 0603
3157	4822 051 30103	10kΩ 5% 0.062W
3158	2322 704 61801	180Ω 1% 0603
3158	5322 117 13061	180Ω 1% 0.063W 0603
3159	4822 051 30103	10kΩ 5% 0.062W
3160	4822 051 30102	1kΩ 5% 0.062W
3161	4822 052 10101	100Ω 5% 0.33W
3164	4822 117 13632	100kΩ 1% 0.62W 0603
3165	2322 704 61801	180Ω 1% 0603
3165	5322 117 13061	180Ω 1% 0.063W 0603
3168	4822 051 20472	4.7kΩ 5% 0.1W
3171	4822 116 52297	68kΩ 5% 0.5W
3172	4822 116 52297	68kΩ 5% 0.5W
3200	4822 051 20229	22Ω 5% 0.1W
3201	4822 051 20229	22Ω 5% 0.1W
3250	4822 117 10833	10kΩ 1% 0.1W
3261	4822 117 11373	100Ω 1% 0805
3262	4822 117 11373	100Ω 1% 0805
3400	4822 052 11108	1Ω 5% 0.5W
3401	4822 053 12279	27R00 5% 3W
3402	4822 053 10121	120Ω 5% 1W
3403	4822 116 52175	100Ω 5% 0.5W
3404	4822 051 30471	470Ω 5% 0.062W
3406	4822 117 11373	100Ω 1% 0805
3407	4822 051 30103	10kΩ 5% 0.062W
3409	4822 050 11002	1kΩ 1% 0.4W
3410	4822 051 20479	47Ω 5% 0.1W
3411	2122 101 02111	39Ω 5% 0,5W
3412	4822 117 11817	1.2kΩ 1% 0.062W
3414	4822 051 30331	330Ω 5% 0.062W
3415	3198 012 31590	15Ω 5% 3W
3417	4822 116 52176	10Ω 5% 0.5W
3418	4822 050 25603	56kΩ 1% 0.6W
3419	4822 051 30474	470kΩ 5% 0.062W
3420	4822 051 30332	3.3kΩ 5% 0.062W
3421	4822 051 30474	470kΩ 5% 0.062W
3422	4822 051 30332	3.3kΩ 5% 0.062W
3423	4822 053 10688	6.8Ω 5% 1W
3425	4822 116 52176	10Ω 5% 0.5W
3426	4822 116 52176	10Ω 5% 0.5W
3427	4822 051 30683	68kΩ 5% 0.062W
3427	4822 117 13632	100kΩ 1% 0.62W 0603
3428	4822 051 30684	680kΩ 5% 0.062W
3429	4822 051 30103	10kΩ 5% 0.062W
3429	4822 051 30223	22kΩ 5% 0.062W
3430	4822 051 30123	12kΩ 5% 0.062W
3430	4822 051 30223	22kΩ 5% 0.062W
3431	2306 207 03151	150Ω 5% 0.5W
3440	4822 051 30102	1kΩ 5% 0.062W
3441	4822 051 30223	22kΩ 5% 0.062W
3442	4822 051 30474	470kΩ 5% 0.062W
3443	4822 051 30684	680kΩ 5% 0.062W
3447	4822 117 11373	100Ω 1% 0805
3449	4822 052 10101	100Ω 5% 0.33W
3450	4822 050 21003	10kΩ 1% 0.6W
3451	4822 050 21003	10kΩ 1% 0.6W
3454	4822 051 20108	1Ω 5% 0.1W
3455	4822 117 12902	8.2kΩ 1% 0.063W 0603
3455	5322 117 13056	8.2kΩ 1% 0.063W 0603
3456	4822 117 12903	1.8kΩ 1% 0.063W 0603
3457	4822 051 30152	1.5kΩ 5% 0.062W
3458	4822 051 30471	470Ω 5% 0.062W
3459	4822 051 30272	2.7kΩ 5% 0.062W
3460	4822 052 10108	1Ω 5% 0.33W
3461	4822 052 10108	1Ω 5% 0.33W
3462	4822 052 11108	1Ω 5% 0.5W
3463	4822 052 11108	1Ω 5% 0.5W
3464	4822 052 11108	1Ω 5% 0.5W
3465	4822 052 11108	1Ω 5% 0.5W
3466	4822 051 30472	4.7kΩ 5% 0.062W
3467	4822 117 13632	100kΩ 1% 0.62W 0603
3472	4822 051 30393	39kΩ 5% 0.062W
3474	4822 051 30563	56kΩ 5% 0.062W
3475	4822 051 30472	4.7kΩ 5% 0.062W
3476	4822 116 83874	220kΩ 5% 0.5W
3478	4822 116 52175	100Ω 5% 0.5W
3479	4822 052 10478	4.7Ω 5% 0.33W
3480	4822 052 10478	4.7Ω 5% 0.33W
3480	4822 052 10688	6.8Ω 5% 0.33W
3481	2322 750 61001	100Ω 5% 1206
3482	4822 051 30221	220Ω 5% 0.062W
3483	4822 117 12903	1.8kΩ 1% 0.063W 0603
3485	4822 051 30471	470Ω 5% 0.062W
3486	2322 704 67502	7.5kΩ 1% 0,5W
3487	5322 117 13056	8.2kΩ 1% 0.063W 0603
3488	4822 050 21005	1MΩ 1% 0.6W
3489	4822 051 30103	10kΩ 5% 0.062W
3490	4822 051 30332	3.3kΩ 5% 0.062W
3491	4822 117 12925	47kΩ 1% 0.063W 0603
3492	4822 116 52175	100Ω 5% 0.5W
3493	4822 050 21504	150kΩ 1% 0.6W
3495	4822 050 21503	15kΩ 1% 0.6W
3496	4822 051 30272	2.7kΩ 5% 0.062W
3497	4822 051 30333	33kΩ 5% 0.062W
3501	2120 103 90057	100Ω 20% 0.5W
3504	4822 051 30222	2.2kΩ 5% 0.062W
3505	4822 116 52257	22kΩ 5% 0.5W
3506	4822 051 30562	5.6kΩ 5% 0.063W 0603
3507	4822 050 21604	160kΩ 1% 0.6W
3508	4822 116 52182	15Ω 5% 0.5W
3509	2122 550 00158	VDR 1mA 612V
3510	5322 117 12487	1kΩ 1% 0.125W
3511	4822 053 11222	2.2kΩ 5% 2W
3512	4822 117 12891	220kΩ 1% 0.063W 0603
3513	4822 116 52272	330k 5% 0.5W
3514	2322 193 53397	0.39Ω 5% 0.6W
3515	2322 193 53397	0.39Ω 5% 0.6W
3517	4822 117 10834	47kΩ 1% 0.1W
3518	4822 116 52234	100kΩ 5% 0,5W
3519	4822 051 30102	1kΩ 5% 0.062W
3520	4822 053 11333	33kΩ 5% 2W
3521	4822 053 21155	1.5Ω 5% 0.5W
3522	4822 117 11507	6.8kΩ 1% 0.1W
3523	4822 051 20105	1MΩ 5% 0.1W
3524	4822 051 30333	33kΩ 5% 0.062W
3525	4822 051 30479	47Ω 5% 0.062W
3527	4822 117 11951	2kΩ 1% 0.1W
3528	4822 051 30103	10kΩ 5% 0.062W
3529	4822 051 30472	4.7kΩ 5% 0.062W
3530	4822 051 30102	1kΩ 5% 0.062W
3531	4822 117 11507	6.8kΩ 1% 0.1W
3532	4822 117 12925	47kΩ 1% 0.063W 0603
3533	4822 116 52182	15Ω 5% 0.5W
3534	4822 117 12925	47kΩ 1% 0.063W 0603
3535	4822 051 30479	47Ω 5% 0.062W
3536	4822 051 30152	1.5kΩ 5% 0.062W
3537	4822 052 10102	1kΩ 5% 0.33W
3540	4822 050 23303	33k 1% 0.6W
3541	4822 116 52186	22Ω 5% 0.5W
3543	4822 050 24708	4.7Ω 1% 0.6W
3547	4822 051 30008	Jumper 0603
3549	4822 051 30393	39kΩ 5% 0.062W
3550	2122 663 00018	PTC 4.7Ω 20%
3552	4822 051 30222	2.2kΩ 5% 0.062W
3553	4822 051 30103	10kΩ 5% 0.062W
3610	4822 051 30223	22kΩ 5% 0.062W
3611	4822 051 30222	2.2kΩ 5% 0.062W
3620	4822 050 21808	1.8Ω 1% 0,6W
3620	4822 116 80176	1Ω 5% 0.5W
3621	4822 116 80176	1Ω 5% 0.5W
3622	4822 116 81154	2.2Ω 5% 0.5W
3622	5322 116 53564	3.3Ω 5% 0.5W
3623	4822 116 52251	18kΩ 5% 0.5W
3624	4822 052 10158	1.5Ω 5% 0.33W
3625	4822 116 52206	120Ω 5% 0.5W
3625	4822 116 52219	330Ω 5% 0.5W
3626	4822 116 52175	100Ω 5% 0.5W
3626	4822 116 52219	330Ω 5% 0.5W
3627	4822 051 20223	22kΩ 5% 0.1W
3630	4822 051 30333	33kΩ 5% 0.062W
3631	4822 051 30222	2.2kΩ 5% 0.062W
3632	4822 051 30393	39kΩ 5% 0.062W
3633	4822 051 30563	56kΩ 5% 0.062W
3634	4822 116 83882	39kΩ 5% 0.5W
3635	4822 116 52219	330Ω 5% 0.5W
3636	4822 051 30223	22kΩ 5% 0.062W
3637	4822 051 30103	10kΩ 5% 0.062W
3638	4822 051 30474	470kΩ 5% 0.062W
3639	4822 051 30563	56kΩ 5% 0.062W
3640	4822 051 30222	2.2kΩ 5% 0.062W
3641	4822 116 83883	470Ω 5% 0.5W
3642	4822 101 11193	47kΩ 30% 0.1W
3643	4822 051 30334	330kΩ 5% 0.062W
3644	4822 051 30221	220Ω 5% 0.062W
3645	4822 116 52245	150kΩ 5% 0.5W
3646	4822 117 12925	47kΩ 1% 0.063W 0603
3647	4822 051 20228	2.2Ω 5% 0.1W
3652	4822 051 20479	47Ω 5% 0.1W
3653	4822 051 20223	22kΩ 5% 0.1W
3655	4822 051 30123	12kΩ 5% 0.062W
3656	4822 117 11817	1.2kΩ 1% 0.062W
3657	4822 051 30223	22kΩ 5% 0.062W
3658	4822 051 30223	22kΩ 5% 0.062W
3659	4822 051 30222	2.2kΩ 5% 0.062W
3660	4822 051 30562	5.6kΩ 5% 0.063W 0603
3661	4822 116 52226	560Ω 5% 0.5W
3662	4822 051 30152	1.5kΩ 5% 0.062W
3681	4822 116 52207	1.2kΩ 5% 0.5W
3682	4822 117 13632	100kΩ 1% 0.62W 0603
3683	4822 051 30103	10kΩ 5% 0.062W
3684	4822 051 30682	6.8kΩ 5% 0.062W
3685	4822 051 30273	27kΩ 5% 0.062W
3686	4822 051 30563	56kΩ 5% 0.062W
3687	4822 116 52207	1.2kΩ 5% 0.5W
3688	4822 051 20684	680kΩ 5% 0.1W
3690	4822 051 30109	10Ω 5% 0.062W
3701	4822 051 30103	10kΩ 5% 0.062W
3701	4822 117 12925	47kΩ 1% 0.063W 0603
3702	4822 051 30223	22kΩ 5% 0.062W
3703	4822 051 30103	10kΩ 5% 0.062W
3703	4822 117 12925	47kΩ 1% 0.063W 0603
3704	4822 051 30223	22kΩ 5% 0.062W
3707	4822 051 30103	10kΩ 5% 0.062W
3708	4822 117 12925	47kΩ 1% 0.063W 0603
3710	4822 117 12925	47kΩ 1% 0.063W 0603
3711	4822 051 30103	10kΩ 5% 0.062W
3713	2322 702 81828	8.2Ω 5% 0.1W 0603
3714	2322 702 81828	8.2Ω 5% 0.1W 0603
3716	4822 050 21003	10kΩ 1% 0.6W
3719	4822 051 30103	10kΩ 5% 0.062W
3720	4822 052 10108	1Ω 5% 0.33W
3721	4822 052 10108	1Ω 5% 0.33W
3725	4822 116 52251	18kΩ 5% 0.5W
3726	4822 050 21003	10kΩ 1% 0.6W
3904	4822 052 10688	6.8Ω 5% 0.33W
3905	4822 051 30101	100Ω 5% 0.062W
3912	4822 051 30008	Jumper 0603
3928	4822 051 30101	100Ω 5% 0.062W
3929	4822 051 30103	10kΩ 5% 0.062W
3930	4822 051 20561	560Ω 5% 0.1W
3938	4822 117 11373	100Ω 1% 0805
3939	4822 051 30103	10kΩ 5% 0.062W
3940	4822 051 20561	560Ω 5% 0.1W
3941	4822 052 10688	6.8Ω 5% 0.33W
3959	4822 117 10353	150Ω 1% 0.1W
3960	4822 117 10353	150Ω 1% 0.1W
3961	4822 117 10353	150Ω 1% 0.1W
3962	4822 117 10353	150Ω 1% 0.1W
3965	4822 117 10353	150Ω 1% 0.1W
3966	4822 117 10353	150Ω 1% 0.1W
3967	4822 116 52201	75Ω 5% 0.5W
3968	4822 116 52201	75Ω 5% 0.5W
3969	4822 051 20008	Jumper 0805
3969	4822 117 11373	100Ω 1% 0805
3970	4822 051 20008	Jumper 0805
3970	4822 117 11373	100Ω 1% 0805
3971	4822 116 52201	75Ω 5% 0.5W
3972	4822 116 52201	75Ω 5% 0.5W
3973	4822 116 52201	75Ω 5% 0.5W
3974	4822 116 52201	75Ω 5% 0.5W
3975	4822 116 52201	75Ω 5% 0.5W
3976	4822 117 11373	100Ω 1% 0805
3977	4822 051 20008	Jumper 0805
3977	4822 117 11373	100Ω 1% 0805
3978	4822 051 20008	Jumper 0805
3978	4822 117 11373	100Ω 1% 0805
3979	4822 116 52201	75Ω 5% 0.5W
3980	4822 051 20008	Jumper 0805
3980	4822 117 11373	100Ω 1% 0805
3981	4822 051 10102	1kΩ 2% 0.25W
3981	4822 117 10833	10kΩ 1% 0.1W
3982	4822 051 20392	3.9kΩ 5% 0.1W
3982	4822 051 20393	39kΩ 5% 0.1W
3983	4822 116 52175	100Ω 5% 0.5W
3984	4822 051 10102	1kΩ 2% 0.25W
3984	4822 117 10833	10kΩ 1% 0.1W
3985	4822 116 52201	75Ω 5% 0.5W
3986	4822 116 52276	3.9kΩ 5% 0.5W
3986	4822 116 83882	39kΩ 5% 0.5W
3987	4822 116 52175	100Ω 5% 0.5W
3988	4822 051 10102	1kΩ 2% 0.25W
3988	4822 117 11373	100Ω 1% 0805
3989	4822 050 11002	1kΩ 1% 0.4W
3989	4822 116 52175	100Ω 5% 0.5W
3990	4822 117 10353	150Ω 1% 0.1W
3991	4822 117 10353	150Ω 1% 0.1W

3992	4822 117 10353	150Ω 1% 0.1W
3993	4822 116 83868	150Ω 5% 0.5W
3994	4822 051 10102	1kΩ 2% 0.25W
3994	4822 117 11373	100Ω 1% 0805
3995	4822 051 10102	1kΩ 2% 0.25W
3995	4822 117 11373	100Ω 1% 0805
3996	4822 117 10353	150Ω 1% 0.1W
3997	4822 117 10353	150Ω 1% 0.1W
4xxx	4822 051 30008	Jumper 0603
9xxx	4822 051 20008	Jumper 0805
9xxx	4822 051 30008	Jumper 0603

5100	3104 308 20431	Transformer BS25126-03
5101	4822 526 10704	Bead 45Ω at 50MHz
5102	2422 535 94639	10µH 20%
5103	4822 526 10704	Bead 45Ω at 50MHz
5104	4822 157 11411	Bead 83Ω at 100MHz
5105	2422 535 94632	1µH 30%
5106	4822 157 11716	Bead 30Ω at 100MHz
5107	4822 157 11716	Bead 30Ω at 100MHz
5108	4822 526 10704	Bead 45Ω at 50MHz
5110	4822 526 10704	Bead 45Ω at 50MHz
5111	4822 157 11411	Bead 83Ω at 100MHz
5113	4822 157 11411	Bead 83Ω at 100MHz
5130	4822 157 11411	Bead 83Ω at 100MHz
5400	4822 157 11869	33µH 10%
5401	2422 536 00059	12µH 10%
5402	3198 018 21510	150µH 10%
5410	3128 138 39091	Transformer CE165T
5411	4822 157 71097	0.56µH 10%
5421	3104 308 20471	Linearity coil 28"/29"
5421	3104 308 20591	Linearity coil 32"
5422	2422 531 02357	Bridge coil W7132-004Y 29"
5422	4822 146 11137	Bridge coil W7131-003 28"/32"
5423	4822 157 71097	0.56µH 10%
5425	4822 157 11411	Bead 83Ω at 100MHz
5426	4822 157 11411	Bead 83Ω at 100MHz
5430	3104 308 20491	LOT 1392.9014A
5461	4822 157 11411	Bead 83Ω at 100MHz
5463	4822 157 11411	Bead 83Ω at 100MHz
5465	4822 157 11411	Bead 83Ω at 100MHz
5467	4822 157 11411	Bead 83Ω at 100MHz
5469	4822 157 11411	Bead 83Ω at 100MHz
5503	2422 549 44877	Filter 45mH DMF2845H
5505	4822 157 11411	Bead 83Ω at 100MHz
5506	2422 531 02575	Transformer SMT BS30029-01
5506	2422 531 02635	Transformer SMT SS30327-01 B
5507	4822 157 11411	Bead 83Ω at 100MHz
5511	3104 308 20511	Filter mains 40mH
5515	4822 157 11869	33µH 10%
5517	4822 157 11411	Bead 83Ω at 100MHz
5518	4822 526 10704	Bead 45Ω at 50MHz
5519	4822 157 11716	Bead 30Ω at 100MHz
5520	4822 157 11411	Bead 83Ω at 100MHz
5620	4822 157 11771	0.09µH 10%
5621	3104 308 20571	Transf. S13974-03
5901	4822 157 11299	10µH 5%
5902	3198 018 71010	100µF 10%
5903	4822 157 10359	33µH 10%
5904	4822 157 11411	Bead 83Ω at 100MHz

6080	4822 130 11397	BAS316
6082	4822 130 80622	BAT54
6103	4822 130 41601	BYV95A
6104	9340 548 67115	PDZ22B
6105	4822 130 34281	BZX79-B15
6106	3198 010 52290	BZX79-B22
6108	4822 130 80622	BAT54
6109	4822 130 31083	BYW55
6110	4822 130 41487	BYV95C
6111	9322 161 78682	SB360L-7024
6112	4822 130 11551	UDZS10B
6115	4822 130 80622	BAT54
6120	4822 130 30621	1N4148
6121	4822 130 30621	1N4148
6122	3198 010 53980	BZX79-B3V9
6130	4822 130 11596	BYW29EX-200
6132	9322 171 80685	BZX384-B6V8
6133	4822 130 11397	BAS316
6134	4822 130 11397	BAS316
6141	4822 130 11522	UDZ15B
6142	4822 130 80622	BAT54
6144	4822 130 11397	BAS316
6147	4822 130 34278	BZX79-B6V8
6148	5322 130 31938	BYV27-200
6149	4822 130 11397	BAS316
6200	9340 548 71115	PDZ33B
6202	4822 130 11397	BAS316
6400	4822 130 41601	BYV95A
6402	4822 130 11397	BAS316
6405	4822 130 34383	BZX79-B47
6406	4822 130 11397	BAS316
6407	4822 130 11397	BAS316
6408	4822 130 41601	BYV95A
6421	4822 130 10753	BY359X-1500
6422	4822 130 10218	BY229X-800
6442	4822 130 11522	UDZ15B
6455	4822 130 11397	BAS316
6456	5322 130 34337	BAV99
6457	9322 102 64685	UDZ2.7B
6458	3198 020 55680	BZX384-C5V6
6460	4822 130 41487	BYV95C
6462	9340 559 53112	BYW95C-24
6464	9340 559 53112	BYW95C-24
6480	4822 130 31607	RGP10D
6481	4822 130 11522	UDZ15B
6482	4822 130 11397	BAS316
6483	4822 130 80622	BAT54
6493	4822 130 80622	BAT54
6499	4822 130 11551	UDZS10B
6505	4822 130 34281	BZX79-B15
6506	4822 130 80622	BAT54
6509	4822 130 11397	BAS316
6510	4822 130 61219	BZX79-B10
6511	4822 130 11397	BAS316
6512	4822 130 11397	BAS316
6514	5322 130 31932	BZT03-C200
6515	4822 130 33657	BZV85-C6V8
6516	4822 130 11397	BAS316
6517	4822 130 80622	BAT54
6525	3198 010 10640	Bridge cell GBU4K
6530	4822 130 41487	BYV95C
6534	9322 165 72687	DTV1500MFP
6535	4822 130 11572	STPS8H100F
6537	4822 130 11397	BAS316
6538	4822 130 11397	BAS316
6614	4822 130 80622	BAT54
6615	4822 130 11397	BAS316
6616	4822 130 11397	BAS316
6617	4822 130 11397	BAS316
6618	4822 130 11397	BAS316
6619	4822 130 31607	RGP10D
6620	5322 130 31938	BYV27-200
6621	4822 130 31607	RGP10D
6623	4822 130 11397	BAS316
6624	4822 130 11397	BAS316
6625	4822 130 11397	BAS316
6626	4822 130 11397	BAS316
6627	4822 130 11397	BAS316
6901	4822 130 11416	PDZ6.8B
6950	4822 130 11416	PDZ6.8B
6951	4822 130 11416	PDZ6.8B
6953	4822 130 11416	PDZ6.8B
6954	4822 130 11416	PDZ6.8B
6955	4822 130 11416	PDZ6.8B
6956	4822 130 11416	PDZ6.8B
6957	4822 130 11416	PDZ6.8B
6958	4822 130 11416	PDZ6.8B
6959	4822 130 11416	PDZ6.8B
6960	9340 548 61115	PDZ12B
6961	4822 130 11416	PDZ6.8B
6962	4822 130 11416	PDZ6.8B

7100	4822 130 44568	BC557B
7101	4822 130 40981	BC337-25
7102	9322 160 34687	FQPF3N60
7103	9322 149 04682	TCET1102
7130	5322 130 60159	BC846B
7131	4822 130 11336	STP16NE06FP
7132	5322 130 60159	BC846B
7133	4822 130 60373	BC856B
7140	5322 130 60159	BC846B
7141	4822 130 11336	STP16NE06FP
7408	5322 130 44647	BC368
7409	5322 130 60159	BC846B
7421	9340 210 30127	BU2520DX
7440	4822 209 70672	LM358N SEL.
7441	4822 130 60373	BC856B
7442	4822 130 60373	BC856B
7443	5322 130 60159	BC846B
7445	5322 130 60159	BC846B
7450	5322 209 61472	LM393M
7455	4822 209 73852	PMBT2369
7480	4822 130 11417	STP3NB60FP
7482	4822 130 11418	TCDT1102G
7486	5322 130 60159	BC846B
7487	5322 130 60159	BC846B
7501	5322 130 60159	BC846B
7502	4822 130 40959	BC547B
7504	9322 194 20687	STP5NK50ZFP
7506	4822 209 14933	TL431IZ
7507	9322 149 04682	TCET1102
7528	4822 130 40981	BC337-25
7529	4822 130 44461	BC546B
7530	5322 130 60159	BC846B
7611	5322 130 60159	BC846B
7612	5322 130 60159	BC846B
7613	4822 209 81397	TL431CLPST
7614	5322 130 60159	BC846B
7620	4822 209 90009	TDA8177
7641	5322 130 60159	BC846B
7652	5322 130 60159	BC846B
7653	5322 130 60159	BC846B
7654	4822 130 60373	BC856B
7680	4822 209 60956	TDA7052/N2
7681	5322 130 60159	BC846B
7682	5322 130 44647	BC368
7701	9322 166 94682	TDA7495S
7710	5322 130 60159	BC846B
7711	5322 130 60159	BC846B
7901	5322 130 60159	BC846B
7902	5322 130 60159	BC846B
7910	9322 152 53687	LD1086V33
7912	5322 209 86445	LM7805CT

Small Signal Board [B]

Various

1112	2422 549 44369	SAW 38.9MHz K9656L
1113	2422 549 44372	SAW 38.9MHz K3953L
1581	2422 543 01359	Xtal 13.5MHz 12pF NX8045

2002	2020 552 96507	10µF 10V
2003	2020 552 96507	10µF 10V
2005	2020 552 96618	1nF 10% 50V 0402
2006	2020 552 96618	1nF 10% 50V 0402
2008	2020 552 96618	1nF 10% 50V 0402
2012	3198 017 44740	470nF 10V 0603
2013	3198 035 04710	470pF 50V 0402
2014	3198 035 71040	100nF 10% 16V 0402
2015	3198 035 04710	470pF 50V 0402
2016	3198 017 44740	470nF 10V 0603
2018	3198 035 04710	470pF 50V 0402
2019	3198 017 44740	470nF 10V 0603
2021	3198 035 04710	470pF 50V 0402
2022	3198 017 44740	470nF 10V 0603
2024	3198 035 04710	470pF 50V 0402
2025	3198 017 44740	470nF 10V 0603
2027	3198 035 04710	470pF 50V 0402
2028	3198 017 44740	470nF 10V 0603
2030	2020 552 96618	1nF 10% 50V 0402
2031	2020 552 96618	1nF 10% 50V 0402
2032	2020 552 96618	1nF 10% 50V 0402
2033	2020 552 96618	1nF 10% 50V 0402
2037	2020 552 96507	10µF 10V
2038	2020 552 96507	10µF 10V
2039	2020 552 96507	10µF 10V
2040	2020 552 96507	10µF 10V
2045	3198 030 82280	2.2µF 20% 50V
2046	5322 124 41945	22µF 20% 35V
2047	4822 124 23002	10µF 20% 16V
2048	3198 035 71040	100nF 10% 16V 0402
2049	3198 035 71040	100nF 10% 16V 0402
2050	3198 035 71040	100nF 10% 16V 0402
2051	3198 035 71040	100nF 10% 16V 0402
2060	3198 035 71040	100nF 10% 16V 0402
2062	3198 035 71040	100nF 10% 16V 0402
2063	3198 035 71040	100nF 10% 16V 0402
2065	3198 035 71040	100nF 10% 16V 0402
2066	3198 035 71040	100nF 10% 16V 0402
2067	3198 035 71040	100nF 10% 16V 0402
2068	3198 035 71040	100nF 10% 16V 0402
2071	3198 035 71040	100nF 10% 16V 0402
2072	3198 035 71040	100nF 10% 16V 0402
2073	3198 035 71040	100nF 10% 16V 0402
2078	3198 035 71040	100nF 10% 16V 0402
2079	3198 035 71040	100nF 10% 16V 0402
2081	3198 035 71040	100nF 10% 16V 0402
2082	4822 126 14491	2.2µF -20+80% 10V 0805
2083	3198 035 71040	100nF 10% 16V 0402
2084	3198 035 71040	100nF 10% 16V 0402
2085	3198 035 71040	100nF 10% 16V 0402

2088	4822 126 14491	2.2µF -20+80% 10V 0805
2101	3198 035 71030	10nF 16V 0402
2102	3198 035 71030	10nF 16V 0402
2119	3198 035 71030	10nF 16V 0402
2126	2238 869 15101	100pF 5% 50V 0402
2127	3198 035 71040	100nF 10% 16V 0402
2128	3198 030 82280	2.2µF 20% 50V
2130	3198 035 71030	10nF 16V 0402
2134	3198 035 71040	100nF 10% 16V 0402
2135	4822 124 23002	10µF 20% 16V
2136	4822 124 23002	10µF 20% 16V
2137	4822 124 12095	100µF 20% 16V
2138	3198 035 71040	100nF 10% 16V 0402
2150	3198 035 71040	100nF 10% 16V 0402
2151	3198 030 82280	2.2µF 20% 50V
2152	3198 035 71040	100nF 10% 16V 0402
2154	4822 124 23002	10µF 20% 16V
2155	3198 035 71040	100nF 10% 16V 0402
2156	3198 035 71040	100nF 10% 16V 0402
2157	3198 035 71040	100nF 10% 16V 0402
2281	3198 035 71040	100nF 10% 16V 0402
2282	3198 035 71040	100nF 10% 16V 0402
2284	3198 035 71040	100nF 10% 16V 0402
2285	3198 035 71040	100nF 10% 16V 0402
2300	3198 035 71040	100nF 10% 16V 0402
2305	3198 017 41050	1µF 10V 0603
2307	2238 869 15101	100pF 5% 50V 0402
2308	2238 869 15101	100pF 5% 50V 0402
2310	4822 124 23002	10µF 20% 16V
2311	3198 035 71030	10nF 16V 0402
2317	2238 869 15101	100pF 5% 50V 0402
2318	2238 869 15101	100pF 5% 50V 0402
2321	3198 035 71030	10nF 16V 0402
2324	2238 869 15101	100pF 5% 50V 0402
2325	2238 869 75829	82pF 5% 50V 0402
2327	2238 869 15101	100pF 5% 50V 0402
2328	2238 869 15101	100pF 5% 50V 0402
2331	3198 035 71030	10nF 16V 0402
2341	3198 035 71040	100nF 10% 16V 0402
2342	3198 035 71040	100nF 10% 16V 0402
2343	3198 035 71040	100nF 10% 16V 0402
2344	3198 035 71040	100nF 10% 16V 0402
2345	3198 035 71040	100nF 10% 16V 0402
2346	3198 035 71040	100nF 10% 16V 0402
2350	4822 124 12095	100µF 20% 16V
2351	2238 869 15109	10pF 5% 50V 0402
2352	2238 869 15109	10pF 5% 50V 0402
2358	2238 869 15101	100pF 5% 50V 0402
2359	3198 035 71040	100nF 10% 16V 0402
2360	2238 869 15101	100pF 5% 50V 0402
2361	4822 126 14491	2.2µF -20+80% 10V 0805
2363	2238 869 15101	100pF 5% 50V 0402
2364	4822 126 14491	2.2µF -20+80% 10V 0805
2365	2238 869 15101	100pF 5% 50V 0402
2366	4822 126 14491	2.2µF -20+80% 10V 0805
2371	2020 552 96618	1nF 10% 50V 0402
2372	2020 552 96618	1nF 10% 50V 0402
2377	2020 552 96623	2.2nF 10% 50V 0402
2379	2020 552 96623	2.2nF 10% 50V 0402
2380	3198 035 04710	470pF 50V 0402
2384	2020 552 96618	1nF 10% 50V 0402
2386	2238 869 15109	10pF 5% 50V 0402
2395	3198 035 71030	10nF 16V 0402
2397	3198 035 71040	100nF 10% 16V 0402
2432	2020 552 96618	1nF 10% 50V 0402
2433	2020 552 96618	1nF 10% 50V 0402
2434	3198 017 44740	470nF 10V 0603
2435	3198 017 44740	470nF 10V 0603
2438	3198 017 44740	470nF 10V 0603
2439	3198 017 44740	470nF 10V 0603
2440	2020 552 96618	1nF 10% 50V 0402
2441	2020 552 96618	1nF 10% 50V 0402
2442	2020 552 96618	1nF 10% 50V 0402
2443	2020 552 96618	1nF 10% 50V 0402
2444	2020 552 96618	1nF 10% 50V 0402
2445	2020 552 96618	1nF 10% 50V 0402
2447	4822 124 12095	100µF 20% 16V
2450	3198 035 71030	10nF 16V 0402
2452	3198 035 71030	10nF 16V 0402
2454	4822 126 14491	2.2µF -20+80% 10V 0805
2457	4822 126 14491	2.2µF -20+80% 10V 0805
2461	3198 017 44740	470nF 10V 0603
2462	3198 017 44740	470nF 10V 0603
2480	3198 017 44740	470nF 10V 0603
2481	3198 017 44740	470nF 10V 0603
2483	2020 552 96618	1nF 10% 50V 0402
2484	4822 124 23002	10µF 20% 16V
2485	2020 552 96618	1nF 10% 50V 0402
2486	3198 035 71040	100nF 10% 16V 0402
2487	4822 124 23002	10µF 20% 16V
2488	4822 124 12095	100µF 20% 16V
2489	4822 124 12095	100µF 20% 16V
2514	2238 869 15189	18pF 5% 50V 0402
2516	2238 869 15189	18pF 5% 50V 0402
2525	3198 035 71040	100nF 10% 16V 0402
2546	3198 035 71040	100nF 10% 16V 0402
2557	2238 869 15101	100pF 5% 50V 0402
2571	3198 035 71040	100nF 10% 16V 0402
2581	4822 126 14519	22pF 5% 50V 0402
2582	4822 126 14519	22pF 5% 50V 0402
2583	3198 035 71040	100nF 10% 16V 0402
2584	3198 035 71040	100nF 10% 16V 0402
2600	3198 035 71040	100nF 10% 16V 0402
2601	3198 035 71040	100nF 10% 16V 0402
2604	3198 035 71040	100nF 10% 16V 0402
2607	3198 035 71040	100nF 10% 16V 0402
2609	3198 035 71040	100nF 10% 16V 0402
2611	3198 035 71040	100nF 10% 16V 0402
2612	3198 035 71040	100nF 10% 16V 0402
2615	3198 035 71040	100nF 10% 16V 0402
2618	3198 035 71040	100nF 10% 16V 0402
2620	3198 035 71040	100nF 10% 16V 0402
2622	3198 035 71040	100nF 10% 16V 0402
2623	3198 035 71040	100nF 10% 16V 0402
2628	3198 035 71040	100nF 10% 16V 0402
2629	3198 035 71040	100nF 10% 16V 0402
2630	3198 035 71040	100nF 10% 16V 0402
2633	3198 035 71040	100nF 10% 16V 0402
2634	3198 035 71040	100nF 10% 16V 0402
2638	3198 035 71040	100nF 10% 16V 0402
2644	5322 124 41945	22µF 20% 35V
2645	4822 124 23002	10µF 20% 16V
2651	2020 021 91679	100µF 20% 6.3V
2652	2020 552 96507	10µF 10V
2654	2020 552 96507	10µF 10V
2655	2020 552 96507	10µF 10V
2656	3198 035 71040	100nF 10% 16V 0402
2657	2238 869 15101	100pF 5% 50V 0402
2659	4822 126 13879	220nF 20% 16V
2730	3198 035 71040	100nF 10% 16V 0402
2731	3198 035 71040	100nF 10% 16V 0402
2732	3198 035 71040	100nF 10% 16V 0402
2733	3198 035 71040	100nF 10% 16V 0402
2734	3198 035 71040	100nF 10% 16V 0402
2792	3198 035 71040	100nF 10% 16V 0402
2793	3198 035 71040	100nF 10% 16V 0402
2918	2238 869 15101	100pF 5% 50V 0402
2919	2238 869 15101	100pF 5% 50V 0402
2920	2238 869 75829	82pF 5% 50V 0402
2932	2238 869 15101	100pF 5% 50V 0402
2933	2238 869 15101	100pF 5% 50V 0402
2935	2238 869 15101	100pF 5% 50V 0402
2936	2238 869 15101	100pF 5% 50V 0402
2938	2238 869 15101	100pF 5% 50V 0402
2948	2238 869 15189	18pF 5% 50V 0402
2949	2238 869 15189	18pF 5% 50V 0402
2950	2238 869 15101	100pF 5% 50V 0402
2951	2238 869 15101	100pF 5% 50V 0402
2962	2238 869 15101	100pF 5% 50V 0402
2967	2020 552 96618	1nF 10% 50V 0402
2968	2020 552 96618	1nF 10% 50V 0402
2975	2020 552 96793	4.7nF 10% 50V 0402
2976	2020 552 96793	4.7nF 10% 50V 0402
2977	2238 869 15101	100pF 5% 50V 0402
2978	2238 869 15101	100pF 5% 50V 0402
2979	2238 869 15101	100pF 5% 50V 0402

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3002	3198 031 04730	47Ω 5% 0402
3003	3198 031 04730	47Ω 5% 0402
3004	3198 031 04730	47Ω 5% 0402
3005	3198 031 04730	47Ω 5% 0402
3006	3198 031 04730	47Ω 5% 0402
3007	3198 031 04730	47Ω 5% 0402
3010	4822 117 13605	Jumper 0402
3011	4822 117 13605	Jumper 0402
3018	4822 117 11152	4.7Ω 5% 0.062W
3019	5322 117 11726	10Ω 5%
3022	3198 031 04730	47Ω 5% 0402
3024	3198 031 04730	47Ω 5% 0402
3026	3198 031 04730	47Ω 5% 0402
3027	3198 031 04730	47Ω 5% 0402
3060	4822 117 13602	2.2kΩ 5% 0.01W 0402
3061	4822 117 13602	2.2kΩ 5% 0.01W 0402
3062	3198 031 01810	180Ω 5% 0402
3063	3198 031 01810	180Ω 5% 0402
3066	4822 117 13602	2.2kΩ 5% 0.01W 0402
3067	4822 117 13548	1kΩ 5% 0402
3068	4822 117 13548	1kΩ 5% 0402
3101	4822 117 13602	2.2kΩ 5% 0.01W 0402
3103	3198 031 06820	6.8kΩ 5% 0.01W 0402
3104	4822 117 13602	2.2kΩ 5% 0.01W 0402
3106	3198 031 02730	27kΩ 5% 0402
3131	3198 031 04720	4.7kΩ 5% 0402
3132	4822 117 13545	100Ω 1% 0402
3138	3198 031 03910	390Ω 1% 0402
3150	3198 031 01820	1K8 5% 0402
3151	3198 031 01220	1K2 5% 0402
3152	3198 031 01820	1K8 5% 0402
3153	3198 031 01220	1K2 5% 0402
3154	3198 031 04730	47Ω 5% 0402
3155	3198 031 08210	820Ω 5% 0,5W
3281	4822 117 13548	1kΩ 5% 0402
3282	4822 117 13548	1kΩ 5% 0402
3283	4822 117 13548	1kΩ 5% 0402
3284	4822 117 13548	1kΩ 5% 0402
3302	3198 031 01220	1K2 5% 0402
3303	3198 031 06820	6.8kΩ 5% 0.01W 0402
3304	4822 117 13597	330Ω 5% 0402 0.01W
3305	4822 117 13548	1kΩ 5% 0402
3306	3198 031 03390	33Ω 1% 0402
3307	2322 705 87189	18Ω 5% 0402
3309	4822 051 30331	330Ω 5% 0.062W
3310	3198 031 01220	1K2 5% 0402
3311	3198 031 03390	33Ω 1% 0402
3312	3198 031 01220	1K2 5% 0402
3313	4822 117 13597	330Ω 5% 0402 0.01W
3316	2322 705 87189	18Ω 5% 0402
3318	3198 031 01220	1K2 5% 0402
3319	4822 051 30331	330Ω 5% 0.062W
3320	3198 031 01220	1K2 5% 0402
3321	3198 031 03390	33Ω 1% 0402
3322	3198 031 01220	1K2 5% 0402
3323	4822 117 13597	330Ω 5% 0402 0.01W
3325	3198 031 04720	4.7kΩ 5% 0402
3326	4822 117 13543	470Ω 5% 0402
3329	4822 051 30331	330Ω 5% 0.062W
3330	3198 031 01220	1K2 5% 0402
3331	3198 031 03390	33Ω 1% 0402
3332	3198 031 01220	1K2 5% 0402
3333	4822 117 13597	330Ω 5% 0402 0.01W
3334	3198 031 03390	33Ω 1% 0402
3335	3198 031 03390	33Ω 1% 0402
3336	3198 031 03390	33Ω 1% 0402
3337	3198 031 03390	33Ω 1% 0402
3338	2322 705 87189	18Ω 5% 0402
3340	4822 117 13548	1kΩ 5% 0402
3343	4822 117 13606	10kΩ 5% 0.01W 0402
3345	3198 031 06820	6.8kΩ 5% 0.01W 0402
3346	4822 117 13548	1kΩ 5% 0402
3347	4822 117 13601	22kΩ 5% 0402
3348	4822 117 13601	22kΩ 5% 0402
3349	3198 031 04730	47Ω 5% 0402
3350	4822 117 13596	220Ω 5% 0.01W 0402
3351	4822 117 13548	1kΩ 5% 0402
3352	3198 031 04730	47Ω 5% 0402
3353	4822 117 13606	10kΩ 5% 0.01W 0402
3354	4822 117 13606	10kΩ 5% 0.01W 0402
3355	4822 117 13601	22kΩ 5% 0402
3356	3198 031 08210	820Ω 5% 0,5W
3357	4822 117 13601	22kΩ 5% 0402
3358	5322 117 11726	10Ω 5%
3361	4822 117 13605	Jumper 0402
3364	2322 705 70124	120kΩ 5% 0402
3365	4822 117 13605	Jumper 0402
3366	4822 117 13602	2.2kΩ 5% 0.01W 0402
3367	4822 117 13548	1kΩ 5% 0402
3368	3198 031 06830	68kΩ 5% 0.01W 0402
3371	4822 117 13548	1kΩ 5% 0402
3372	2322 705 70155	1.5MΩ 5% 0402
3373	4822 117 13606	10kΩ 5% 0.01W 0402
3374	3198 031 02720	2.7kΩ 5% 0.01W 0402
3375	3198 031 02720	2.7kΩ 5% 0.01W 0402
3376	4822 117 13606	10kΩ 5% 0.01W 0402
3377	3198 031 02250	2.2MΩ 5% 0402
3378	3198 031 03340	330kΩ 5% 0402
3380	4822 117 13606	10kΩ 5% 0.01W 0402
3382	4822 117 13548	1kΩ 5% 0402
3384	4822 117 13606	10kΩ 5% 0.01W 0402
3385	3198 031 04730	47Ω 5% 0402
3386	3198 031 02730	27kΩ 5% 0402
3390	4822 117 13548	1kΩ 5% 0402
3391	3198 031 03930	39kΩ 5% 0402
3392	3198 031 04730	47Ω 5% 0402
3393	3198 031 03320	3.3kΩ 5% 0402
3395	4822 117 13606	10kΩ 5% 0.01W 0402
3396	4822 117 13543	470Ω 5% 0402
3397	4822 117 13543	470Ω 5% 0402
3398	4822 117 13545	100Ω 1% 0402
3445	3198 031 04730	47Ω 5% 0402
3446	3198 031 05630	56kΩ 5% 0402
3447	3198 031 05630	56kΩ 5% 0402
3448	3198 031 01220	1K2 5% 0402
3449	3198 031 01520	1.2kΩ 5% 0.01W 0402
3450	3198 031 01220	1K2 5% 0402
3452	3198 031 01220	1K2 5% 0402
3453	3198 031 04730	47Ω 5% 0402
3454	3198 031 05630	56kΩ 5% 0402
3455	3198 031 05630	56kΩ 5% 0402
3456	3198 031 01220	1K2 5% 0402

3457	3198 031 01520	1.2kΩ 5% 0.01W 0402
3480	3198 031 02720	2.7kΩ 5% 0.01W 0402
3481	3198 031 02720	2.7kΩ 5% 0.01W 0402
3482	3198 031 04720	4.7kΩ 5% 0402
3483	3198 031 08220	8.2kΩ 5% 0.5W
3484	3198 031 04720	4.7kΩ 5% 0402
3485	3198 031 08220	8.2kΩ 5% 0.5W
3501	4822 117 13606	10kΩ 5% 0.01W 0402
3502	4822 117 13606	10kΩ 5% 0.01W 0402
3503	4822 117 13606	10kΩ 5% 0.01W 0402
3504	4822 117 13606	10kΩ 5% 0.01W 0402
3507	4822 117 13606	10kΩ 5% 0.01W 0402
3508	3198 031 04720	4.7kΩ 5% 0402
3509	3198 031 02720	2.7kΩ 5% 0.01W 0402
3510	3198 031 02720	2.7kΩ 5% 0.01W 0402
3511	4822 117 13546	47Ω 5% 0402
3512	4822 117 13546	47Ω 5% 0402
3513	3198 031 02720	2.7kΩ 5% 0.01W 0402
3515	3198 031 02720	2.7kΩ 5% 0.01W 0402
3518	4822 117 13601	22kΩ 5% 0402
3523	4822 117 13606	10kΩ 5% 0.01W 0402
3530	4822 117 11297	100kΩ 5% 0.1W
3547	3198 031 03390	33Ω 1% 0402
3550	3198 031 04720	4.7kΩ 5% 0402
3557	4822 117 13546	47Ω 5% 0402
3563	4822 117 13606	10kΩ 5% 0.01W 0402
3564	4822 117 13606	10kΩ 5% 0.01W 0402
3565	4822 117 13606	10kΩ 5% 0.01W 0402
3570	4822 117 13602	2.2kΩ 5% 0.01W 0402
3571	3198 031 02720	2.7kΩ 5% 0.01W 0402
3572	4822 117 13606	10kΩ 5% 0.01W 0402
3581	4822 117 13545	100Ω 1% 0402
3582	4822 117 13606	10kΩ 5% 0.01W 0402
3583	3198 031 01830	18kΩ 5% 0.01W 0402
3586	4822 117 13601	22kΩ 5% 0402
3590	4822 117 13548	1kΩ 5% 0402
3651	5322 117 13036	1.2kΩ 1% 0.063W 0603
3652	5322 117 13052	2.7kΩ 1% 0.063W 0603
3737	3198 031 03390	33Ω 1% 0402
3904	4822 117 13605	Jumper 0402
3909	4822 117 13545	100Ω 1% 0402
3911	4822 117 13545	100Ω 1% 0402
3918	4822 117 13545	100Ω 1% 0402
3919	4822 117 13545	100Ω 1% 0402
3928	4822 117 13545	100Ω 1% 0402
3929	4822 117 13545	100Ω 1% 0402
3936	4822 117 13545	100Ω 1% 0402
3938	4822 117 13545	100Ω 1% 0402
3950	4822 117 13545	100Ω 1% 0402
3951	4822 117 13545	100Ω 1% 0402
3962	4822 117 13545	100Ω 1% 0402
3963	4822 117 13545	100Ω 1% 0402
3964	4822 117 13545	100Ω 1% 0402
3975	4822 117 13545	100Ω 1% 0402
3976	4822 117 13545	100Ω 1% 0402
3977	4822 117 13545	100Ω 1% 0402
3978	4822 117 13545	100Ω 1% 0402
3979	4822 117 13545	100Ω 1% 0402
3980	4822 117 13545	100Ω 1% 0402
4xxx	4822 117 13605	Jumper 0402

5060	2422 549 44197	Bead 220Ω at 100MHz
5061	2422 549 44197	Bead 220Ω at 100MHz
5062	2422 549 44197	Bead 220Ω at 100MHz
5063	2422 549 44197	Bead 220Ω at 100MHz
5101	4822 157 71303	0.39µH 10% 0805
5102	2422 549 44197	Bead 220Ω at 100MHz
5112	2422 549 44197	Bead 220Ω at 100MHz
5134	2422 549 44197	Bead 220Ω at 100MHz
5135	2422 549 44197	Bead 220Ω at 100MHz
5150	2422 549 44197	Bead 220Ω at 100MHz
5151	2422 549 44197	Bead 220Ω at 100MHz
5152	2422 549 44197	Bead 220Ω at 100MHz
5281	2422 549 44197	Bead 220Ω at 100MHz
5282	2422 549 44197	Bead 220Ω at 100MHz
5283	2422 549 44197	Bead 220Ω at 100MHz
5285	2422 549 44197	Bead 220Ω at 100MHz
5300	2422 549 44197	Bead 220Ω at 100MHz
5307	4822 051 20008	Jumper 0805
5317	4822 051 20008	Jumper 0805
5327	4822 051 20008	Jumper 0805
5328	4822 051 20008	Jumper 0805
5342	2422 549 44197	Bead 220Ω at 100MHz
5343	2422 549 44197	Bead 220Ω at 100MHz
5344	2422 549 44197	Bead 220Ω at 100MHz
5345	2422 549 44197	Bead 220Ω at 100MHz
5450	2422 549 44197	Bead 220Ω at 100MHz
5452	2422 549 44197	Bead 220Ω at 100MHz
5480	2422 549 44197	Bead 220Ω at 100MHz
5570	2422 549 44197	Bead 220Ω at 100MHz
5583	2422 549 44197	Bead 220Ω at 100MHz

5600	4822 157 11716	Bead 30Ω at 100MHz
5601	2422 549 44197	Bead 220Ω at 100MHz
5651	2422 535 94134	10µH 20% 0805
5654	4822 157 11258	1µH 20% NLC322522T
5659	4822 157 71334	0.68µH
5730	2422 549 44197	Bead 220Ω at 100MHz
5731	2422 549 44197	Bead 220Ω at 100MHz
5792	2422 549 44197	Bead 220Ω at 100MHz

6101	4822 130 11525	1SS356
6301	4822 130 11397	BAS316
6327	9322 102 64685	UDZ2.7B
6341	4822 130 11397	BAS316
6353	5322 130 34337	BAV99
6365	5322 130 34337	BAV99
6367	9340 548 67115	PDZ22B
6368	4822 130 11397	BAS316
6381	5322 130 34337	BAV99
6382	4822 130 11594	BZX284-C47
6384	9340 548 67115	PDZ22B
6385	4822 130 11397	BAS316
6397	9340 548 69115	PDZ27B
6398	4822 130 11397	BAS316
6480	9340 548 61115	PDZ12B
6481	9340 548 61115	PDZ12B
6651	9322 128 70685	SMSS14

7060	9340 425 30115	BC847BPN
7062	4822 130 60373	BC856B
7063	4822 130 60373	BC856B
7100	9352 712 54557	PNX3000HL/N1
7101	3198 010 42310	BC847BW
7150	9340 425 20115	BC847BS
7300	9352 735 54557	PNX3002E/N302
7301	4822 130 60373	BC856B
7302	4822 130 60373	BC856B
7303	4822 130 60373	BC856B
7304	3198 010 42310	BC847BW
7310	9340 425 30115	BC847BPN
7320	9340 425 30115	BC847BPN
7330	9340 425 30115	BC847BPN
7346	4822 130 60373	BC856B
7356	4822 130 60373	BC856B
7365	5322 130 60159	BC846B
7382	4822 130 60373	BC856B
7383	9340 425 30115	BC847BPN
7393	3198 010 42310	BC847BW
7432	9340 425 30115	BC847BPN
7433	9340 425 30115	BC847BPN
7480	4822 209 33165	TDA1308T/N1
7525	9322 130 41668	M24C64-WMN6
7581	9352 691 56115	NE56610-45GW
7650	9322 170 61668	CS51033YDR8
7651	9322 170 87668	STS5PF30L
7730	9322 180 88668	K4S641632F-TC75
7790	9322 199 76668	M58LW032C90N1

Side I/O Panel [D]

Various

0240	2422 025 12485	Connector 11p m
0241	4822 267 10734	Connector 5p m
0242	4822 267 10734	Connector 5p m
1254	4822 267 31014	Socket headphone
1255	4822 265 11606	Connector 3p
1256	2422 026 04926	Socket SVHS 4p f

2286	4822 122 33642	150pF 5% 50V
2288	4822 122 33642	150pF 5% 50V
2292	5322 122 32311	470pF 10% 100V
2294	5322 122 32311	470pF 10% 100V
2296	4822 122 30103	22nF 80% 63V
2297	4822 122 30103	22nF 80% 63V

3285	4822 116 52201	75Ω 5% 0.5W
3286	4822 116 52176	10Ω 5% 0.5W
3287	4822 116 52201	75Ω 5% 0.5W
3288	4822 116 52176	10Ω 5% 0.5W
3289	4822 116 52249	1.8kΩ 5% 0.5W
3291	4822 050 11002	1kΩ 1% 0.4W
3292	4822 117 10834	47kΩ 1% 0.1W
3293	4822 050 11002	1kΩ 1% 0.4W
3294	4822 117 10834	47kΩ 1% 0.1W
3295	4822 116 52276	3.9kΩ 5% 0.5W
3296	4822 117 10833	10kΩ 1% 0.1W
3297	4822 117 10833	10kΩ 1% 0.1W
4xxx	4822 051 20008	Jumper 0805

6291	9340 548 61115	PDZ12B
6292	9340 548 61115	PDZ12B
6293	9340 548 61115	PDZ12B
6294	9340 548 61115	PDZ12B
6296	9340 548 61115	PDZ12B
6297	9340 548 61115	PDZ12B

Top Control Panel [E]

Various

0135	3104 311 04671	Cable 3p/1200/3p
0215	2422 025 16601	Connector 3p m
1091	4822 276 13775	Switch
1092	4822 276 13775	Switch
1093	4822 276 13775	Switch
1094	4822 276 13775	Switch

2010	4822 122 33177	10nF 20% 50V

3088	4822 051 30008	Jumper 0603
3089	4822 051 30008	Jumper 0603
3091	4822 051 30561	560Ω 5% 0.062W
3092	4822 051 30391	390Ω 5% 0.062W
3093	4822 051 30561	560Ω 5% 0.062W
3094	4822 051 30271	270Ω 5% 0.062W
3095	4822 051 30332	3.3kΩ 5% 0.062W
3096	4822 051 30152	1.5kΩ 5% 0.062W
4092	4822 051 30008	Jumper 0603

6092	4822 130 10654	BAT254

CRT Panel [F]

Various

0032	4822 492 70788	IC clamp
1298	2422 500 80063	Connector CRT 10p f
1424	2422 025 11244	Connector 7p m
1434	4822 267 10973	Connector 1p m
1483	4822 267 10735	Connector 3p m
1940	2422 025 12485	Connector 11p m
8483	3104 311 03111	Cable 3p/340/3p ferrite

2300	4822 124 40764	22µF 100 V
2301	4822 124 40196	220µF 20% 16V
2304	4822 121 41856	22nF 5% 250V
2306	2238 586 59812	100nF 20-80% 50V 0603
2307	4822 121 41856	22nF 5% 250V
2309	3198 017 42230	22nF 50V
2313	4822 124 12373	47µF 20% 250V
2315	5322 126 11583	10nF 10% 50V 0603
2316	4822 121 40518	100nF 10% 250V
2318	5322 122 32654	22nF 10% 63V
2319	4822 122 30043	10nF 80% 63V
2320	2238 586 59812	100nF 20-80% 50V 0603
2324	5322 121 44356	4.7nF 5% 2kV
2325	2238 586 59812	100nF 20-80% 50V 0603
2330	4822 126 13879	220nF 20% 16V
2338	2238 786 19856	330nF 16V 0603
2409	4822 051 30008	Jumper 0603
2410	3198 017 44740	470nF 10V 0603
2411	4822 126 14585	100nF 10% 50V
2420	4822 051 30008	Jumper 0603

3300	4822 052 10109	10Ω 5% 0.33W
3301	4822 053 12103	10K00 5% 3W
3302	4822 051 30681	680Ω 5% 0.062W

3303	4822 051 30682	6.8kΩ 5% 0.062W
3304	4822 051 10102	1kΩ 2% 0.25W
3306	4822 117 13608	4.7Ω 5% 0603 0.62W
3307	4822 051 30109	10Ω 5% 0.062W
3308	4822 051 30563	56kΩ 5% 0.062W
3310	4822 051 10102	1kΩ 2% 0.25W
3311	4822 051 30181	180Ω 5% 0.062W
3312	4822 051 30222	2.2kΩ 5% 0.062W
3316	4822 051 30563	56kΩ 5% 0.062W
3318	4822 117 12971	15Ω 5% 0.62W 0603
3319	4822 051 30102	1kΩ 5% 0.062W
3323	4822 050 24708	4.7Ω 1% 0.6W
3324	4822 051 30221	220Ω 5% 0.062W
3329	4822 050 24708	4.7Ω 1% 0.6W
3334	4822 050 11002	1kΩ 1% 0.4W
3335	4822 051 30271	270Ω 5% 0.062W
3336	4822 051 30271	270Ω 5% 0.062W
3337	4822 051 30271	270Ω 5% 0.062W
3338	3198 013 01020	1kΩ 2% 0.5W
3339	3198 013 01020	1kΩ 2% 0.5W
3340	3198 013 01020	1kΩ 2% 0.5W
3341	2306 207 03151	150Ω 5% 0.5W
3342	4822 116 83883	470Ω 5% 0.5W
3345	4822 116 52191	33Ω 5% 0.5W
3347	3198 013 01520	1.5kΩ 2% 0.5W
3349	3198 013 01020	1kΩ 2% 0.5W
3350	4822 116 83883	470Ω 5% 0.5W
3351	4822 116 83883	470Ω 5% 0.5W
3352	4822 116 83883	470Ω 5% 0.5W
3354	4822 051 30222	2.2kΩ 5% 0.062W
3355	4822 117 13608	4.7Ω 5% 0603 0.62W
3356	4822 051 10102	1kΩ 2% 0.25W
3357	4822 117 13608	4.7Ω 5% 0603 0.62W
3370	4822 117 13016	VDR 1mA/50V
3371	4822 051 30472	4.7kΩ 5% 0.062W
3401	4822 116 52175	100Ω 5% 0.5W
3403	4822 052 11228	2R20 5% 0,5W
3404	4822 052 11228	2R20 5% 0,5W
3410	4822 051 30103	10kΩ 5% 0.062W
3411	4822 051 30103	10kΩ 5% 0.062W
3412	2322 750 61509	15Ω 5% 1206 fusible
3413	4822 051 30181	180Ω 5% 0.062W
3414	4822 051 30109	10Ω 5% 0.062W
3417	4822 051 30109	10Ω 5% 0.062W
3418	4822 051 30181	180Ω 5% 0.062W
3420	4822 051 30008	Jumper 0603
3427	4822 051 30008	Jumper 0603
3999	4822 051 30152	1.5kΩ 5% 0.062W
9402	4822 051 20008	Jumper 0805
9405	4822 051 30008	Jumper 0603

5300	3104 308 20571	Transf. S13974-03
5400	4822 157 11869	33µH 10%
5401	4822 157 71334	0.68µH

6300	4822 130 83757	BAS216
6301	4822 051 20008	Jumper 0805
6305	9340 553 52115	BAS321
6306	9340 553 52115	BAS321
6307	9340 553 52115	BAS321
6310	4822 130 11397	BAS316
6311	4822 130 11397	BAS316
6312	4822 130 11397	BAS316
6313	4822 130 11397	BAS316
6314	4822 130 11397	BAS316

7300	5322 130 42718	BFS20
7301	5322 130 42718	BFS20
7302	5322 130 62804	BCP53
7303	5322 130 63033	BCP56
7304	4822 130 60383	BF824
7307	9352 561 40112	TDA6108
7308	5322 130 60159	BC846B

DC Shift Panel [G]

Various

0317	4822 265 20723	Connector 2p m
0318	4822 265 20723	Connector 2p m
1430	2422 086 10581	Fuse 400mA 65V
8317	3104 311 01421	Cable 2p3/220/2p3 Wh

2430	4822 122 31177	470pF 10% 500V
2431	4822 122 31177	470pF 10% 500V

5430	3128 138 38911	DC-shift coil CU15

6432	9340 317 00133	BYD33V
6433	9340 317 00133	BYD33V

DAF + 2nd order [I]

Various

0034	3104 304 23041	DAF bracket EMGS
1417	4822 265 20723	Connector 2p m
1418	2422 025 16374	Connector 2p m
1419	4822 265 20723	Connector 2p m
1497	4822 267 10973	Connector 1p m
8418	3104 311 01951	Cable 2p3/560/2p4 Bk

2800	2222 375 90498	470pF 5% 2kV
2821	2222 479 90166	68nF 5% 400V
2890	2222 375 90276	220pF 5% 2kV

3898	4822 116 21211	VDR 420V
3899	4822 116 21211	VDR 420V

5800	2422 531 02437	Transformer S21975-03
5801	2422 531 02435	Transformer C948-02
5801	8228 001 34391	Driver Transformer CU15

Front Interface Panel [J]

Various

0157	3104 311 02421	Cable 5p/480/5p
0177	3104 311 03011	Cable 2p/340/2p Bk
0201	2422 025 16268	Connector 2p m
0202	2422 025 16268	Connector 2p m
0203	2422 025 06353	Connector 5p m
1910	9322 127 54667	TSOP1836UH1
1951	2422 128 02972	Mains switch

2930	4822 124 41584	100µF 20% 10V

3957	4822 053 21335	3.3MΩ 5% 0.5W
3966	4822 053 21335	3.3MΩ 5% 0.5W
3978	4822 051 30008	Jumper 0603
3981	4822 051 30681	680Ω 5% 0.062W
3982	4822 116 52219	330Ω 5% 0.5W
4903	4822 051 30008	Jumper 0603

6901	9322 050 99682	LTL-10224WHCR

11. Revision List

First release